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AUTOMOTIVE INDUSTRIES

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Confusion in Pricing Practices

New GM Torque Converter

Oldsmobile's H. C. Engine and 1949 Models

Increased Possibilities for Stretch Forming

Japan's Reorganized Automobile Industry

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How a textile machinery manufacturer

INCREASED PRODUCTION 275%

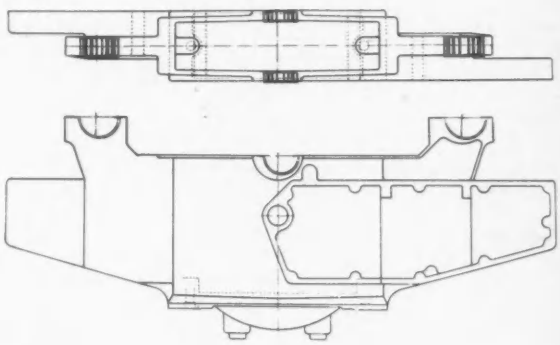
with a new HEALD 321 Bore-Matic

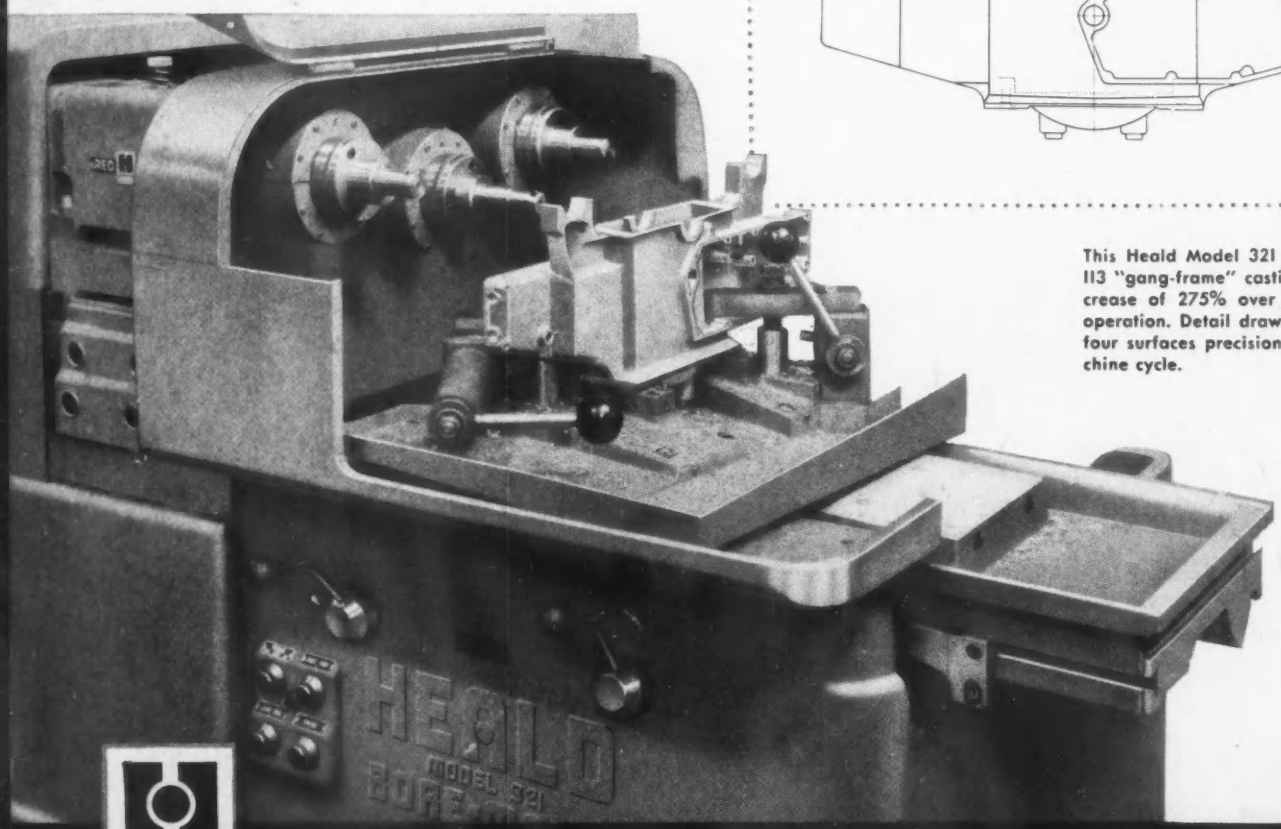
Production of "gang frames" for textile machinery jumped from 30 parts to 113 parts per hour when this new Heald Bore-Matic went on the job. Now, four semi-circular bores in the zinc-die-cast part are finished automatically, with a single setting of the controls. The casting is precisely located from two dowel holes and the milled-off bottom surface, and is secured by manually-operated spring clamps. The machine then starts the automatic cycle—first rapid traversing the table to the left and borizing the left-hand center bore. A jump cam then rapid traverses the table further to the left, for finishing the two end cuts and the right-hand center bore.

"Gang frames" may be a far cry from your precision finishing problem but the implication is obvious; faster, more efficient Heald Bore-Matics mean increased production and greater precision for you at *lower costs*.

. . . AND HERE'S WHY:

1. **FASTER CYCLE**—jump cam and extremely fast table traverse speed up machine operation.
2. **EASE OF OPERATION**—all holes borized automatically after clamping and throwing starting lever.
3. **GREATER ACCURACY**—smooth table operation and high-precision, cool-running heads eliminate scrap.
4. **CONSTANT FEEDS**—hydraulic feeds and speeds retain their settings regardless of temperature changes.
5. **MINIMUM MAINTENANCE**—automatic lubrication and accessible operating units greatly reduce maintenance costs.





This Heald Model 321 Bore-Matic turns out 113 "gang-frame" castings an hour—an increase of 275% over previous method of operation. Detail drawing above shows the four surfaces precision finished in one machine cycle.

HEALD

THE HEALD MACHINE COMPANY, Worcester 6, Mass.

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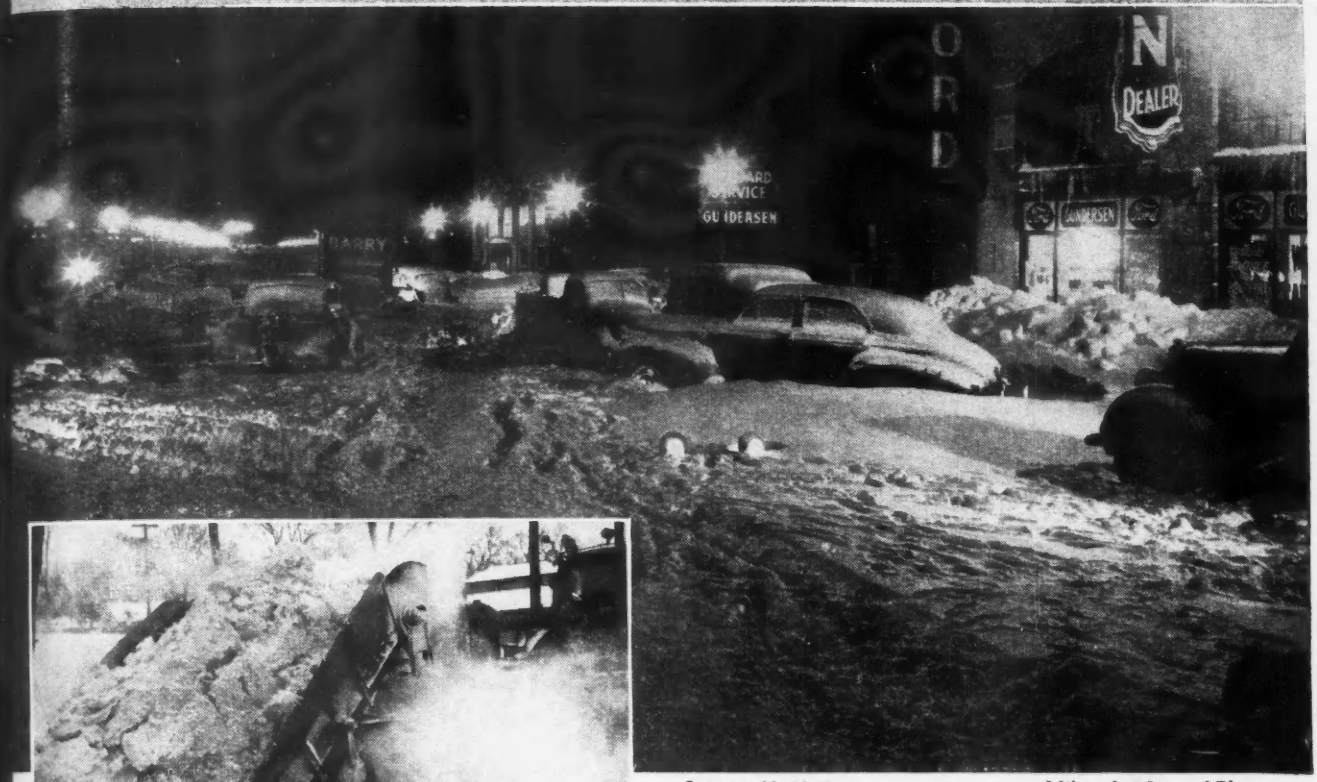
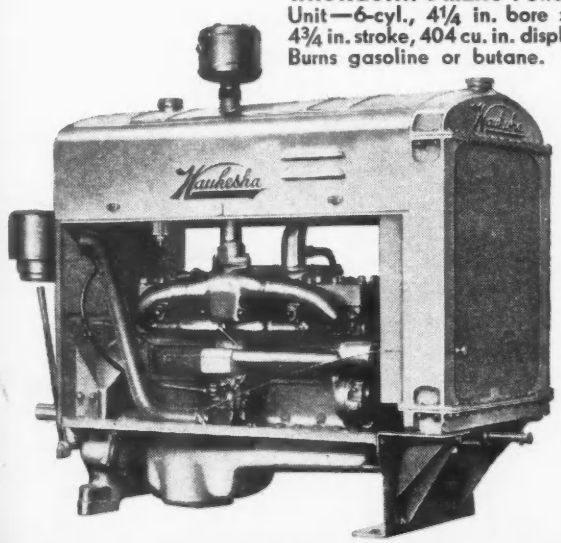
REMEMBER THIS?



January 29, 1947 *Milwaukee Journal Photo*

Waukesha-powered *Pitcher* Snow Mover pitches snow completely off highway; or picks it up off city streets and loads it into trucks.

WAUKESHA 6-MZAU Power Unit—6-cyl., 4¼ in. bore x 4¾ in. stroke, 404 cu. in. displ. Burns gasoline or butane.



● When, and not if, it snows—get those streets and highways open quick . . . and keep 'em open . . .

Look at the way this Waukesha-powered *Pitcher* Snow Mover is doing it—scooping up heavy, ice-crusted snow from head-high drifts . . . pitching it clear off the highway, 40 to 100 feet away into the fields, on either side. On city streets it picks up the snow, loads it at high-speed into trucks alongside.

A chain-driven, endless belt elevator puts the snow into the *Pitcher's* powerful rotating fan that does the pitching. Or, by closing the pitching vent, snow is speedily forced through the elevated loading chute into hauling trucks. And the Waukesha 6-MZAU unit puts plenty of power behind both rotator and elevator.

It's a *smooth* power plant . . . with all Waukesha modern design features, including the special design manifold and Controlled Turbulence combustion chamber. Waukesha low cost operation and maintenance features, too—with Waukesha proved reliability. Send for Bulletin 1270.

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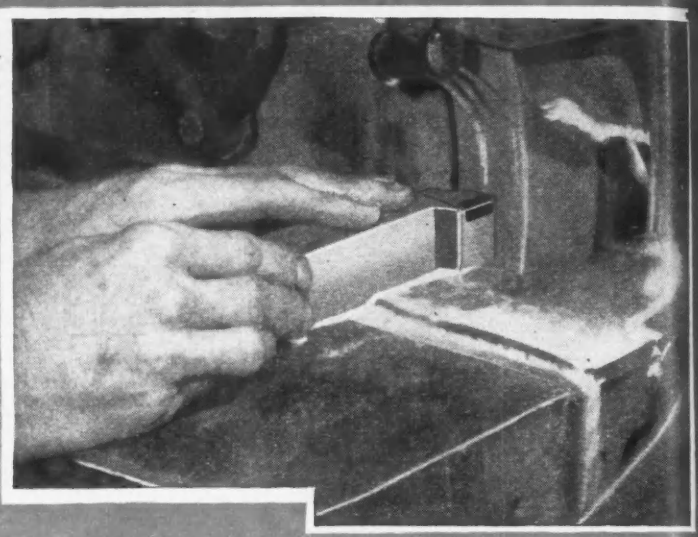
NEW YORK • TULSA • LOS ANGELES

WAUKESHA ENGINES

the grinding job

Off-hand sharpening of a carbide tipped tool, on 14" Hammond Tool Grinder. Widespread and increasing use of these tools makes this an important every day operation in many plants. Correct wheel selection for this specialized work is essential for efficient sharpening without damage to carbide tips.



the wheel

G Electrolon, GC80-I9-V3, 14" x 4" x 11", plate-mounted, Type PM, specially developed to prolong the efficiency of cemented carbide tools with economical grinding cost. Accepted as a standard of excellence throughout industry.

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Simonds Abrasive Company, a major manufacturer of grinding wheels and abrasive products exclusively, maintains a modern electric furnace plant at Arvida, Canada. Here the crude abrasive used in making Simonds grinding wheels is produced. Thus, product quality is controlled from the source, assuring you of lasting performance, top efficiency, better economy when you use Simonds Abrasive wheels on your grinding jobs.

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AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

December 15, 1948 Vol. 99, No. 12

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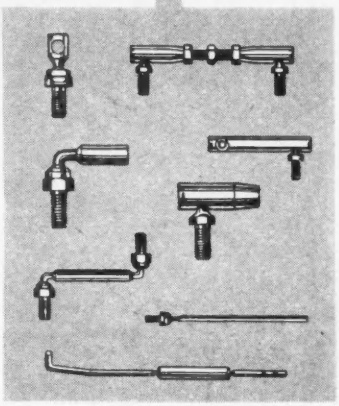

Send for your copy of Tourek's 16-page Ball Joint Catalog. It fully describes 12 standard types in 54 sizes (carried in stock), and has data on special types as well.

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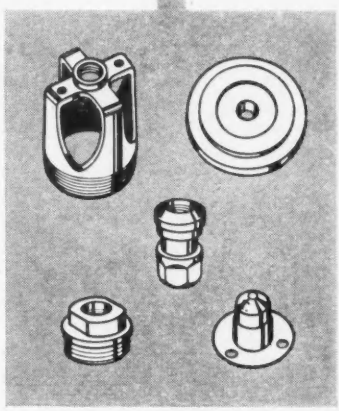
Tourek's modern plant — from the tool room to the batteries of giant 6-spindle automatics — is geared to turn out your screw machine product needs in any size up to 2⅝", from any type of metal. Twenty-eight years of production experience back up every job which Tourek undertakes.



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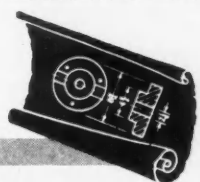

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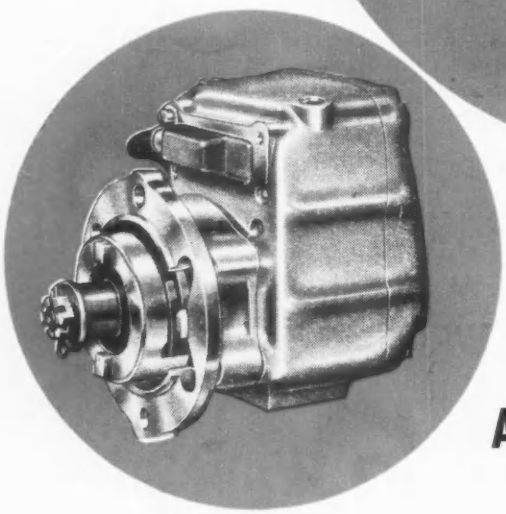

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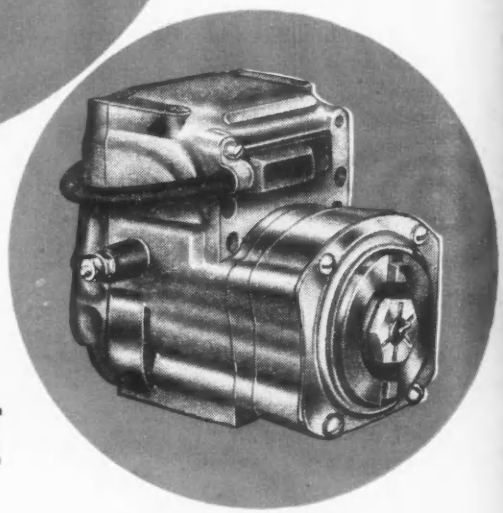

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Policy

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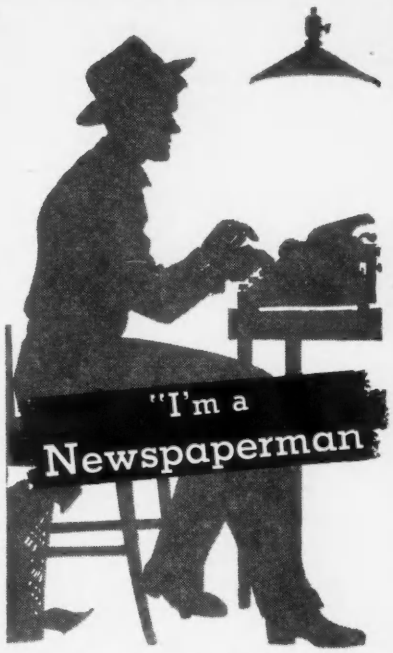

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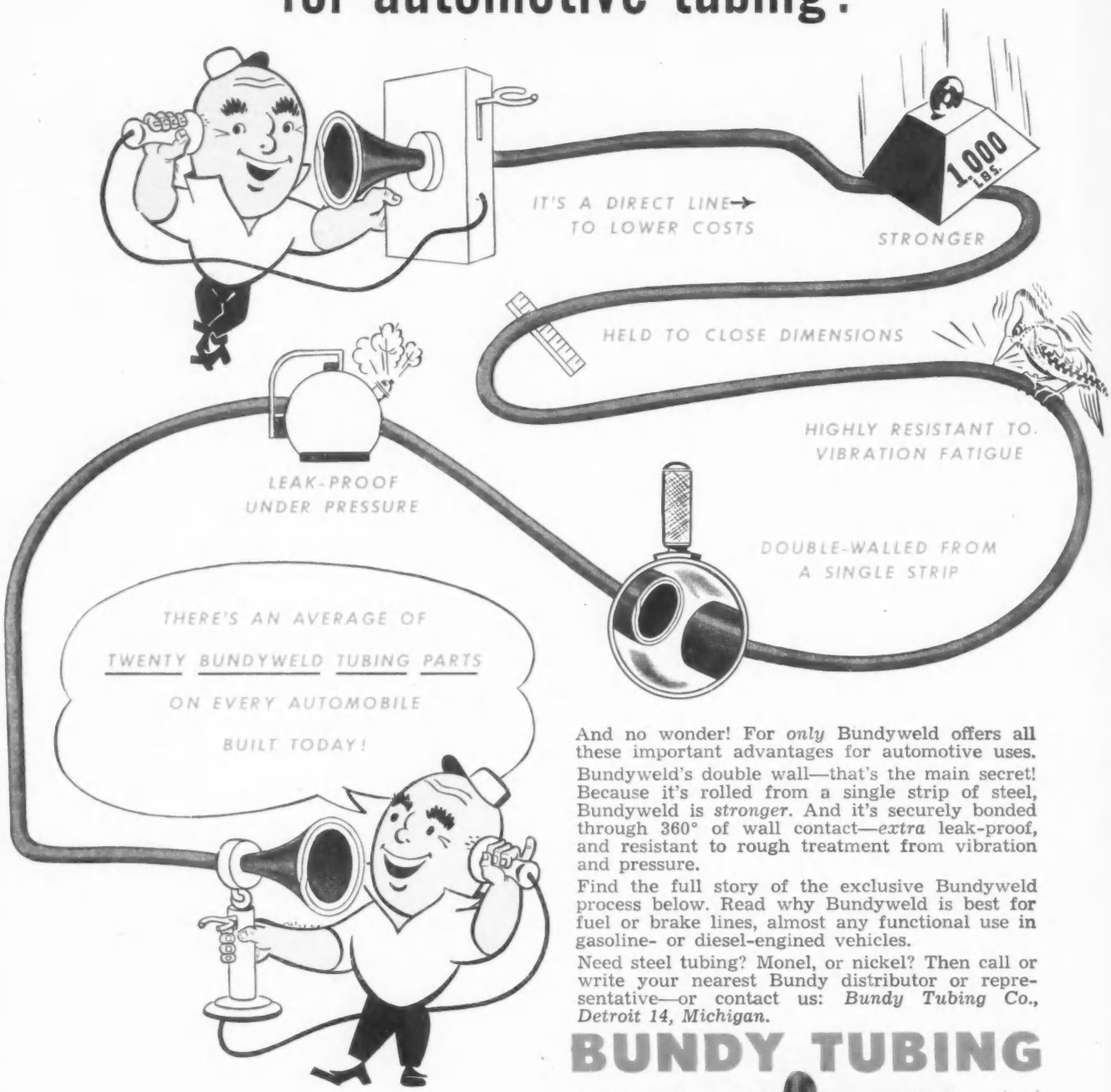

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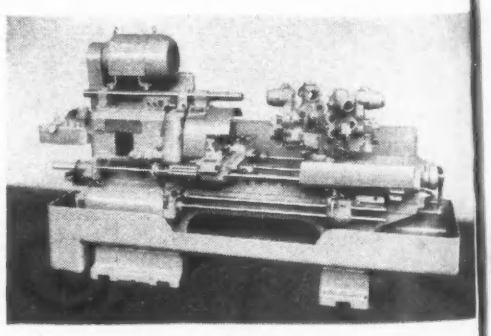

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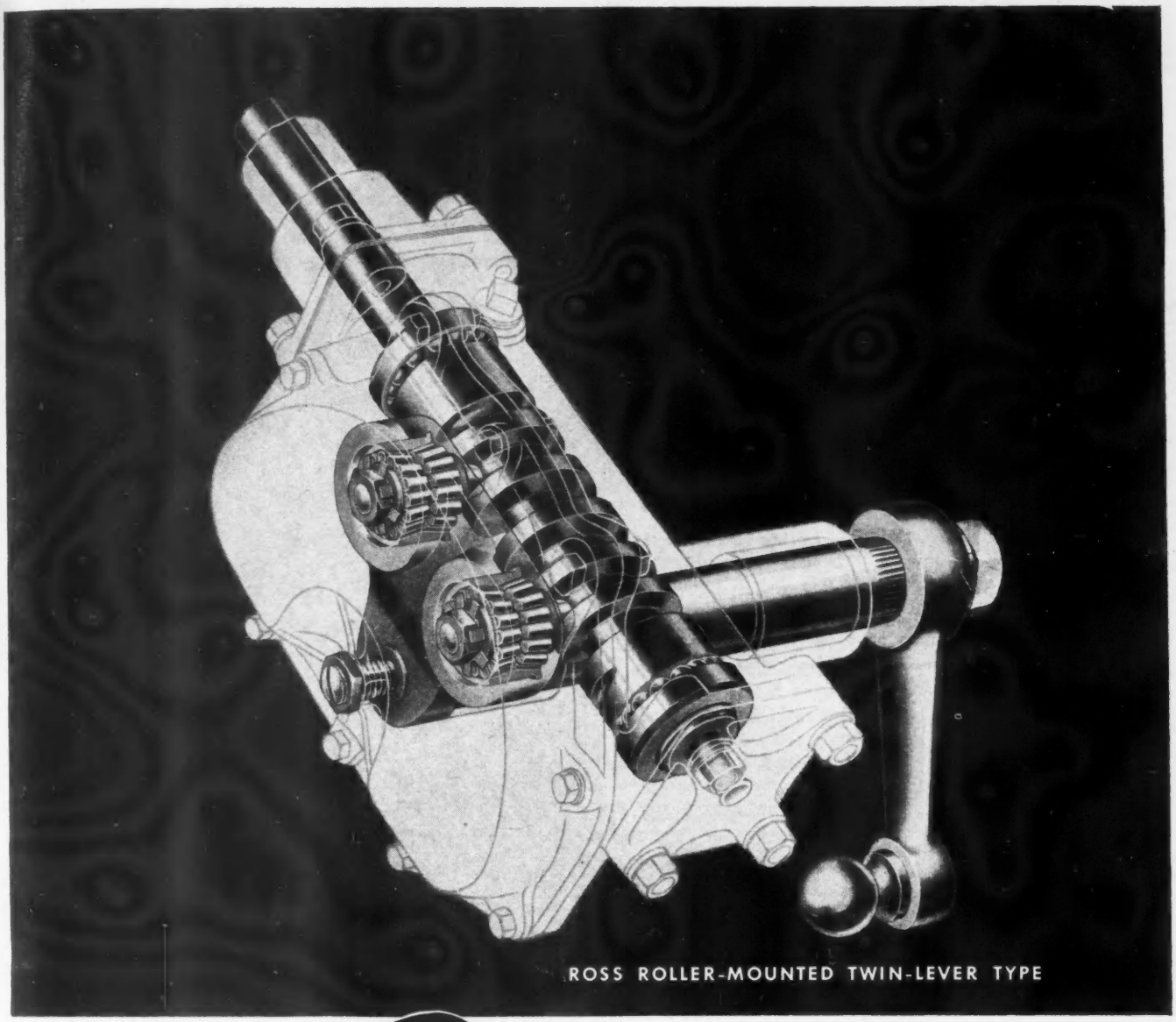

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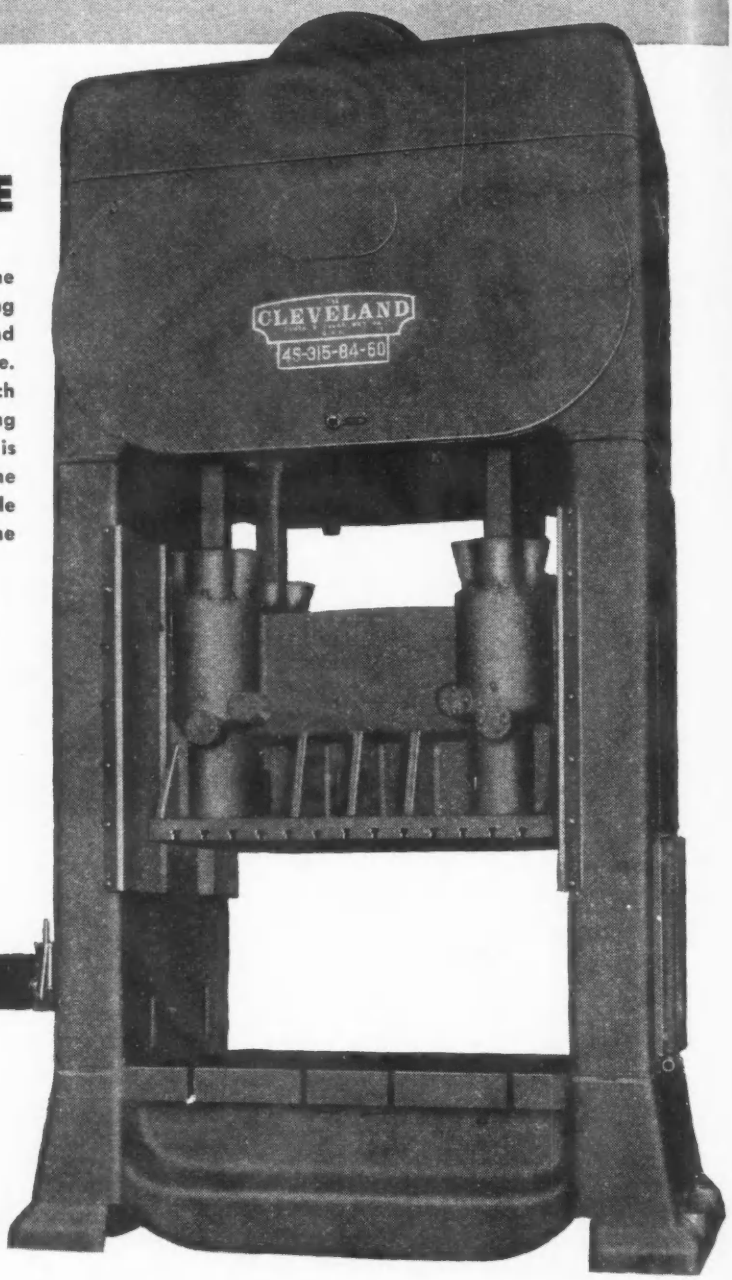

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Stroke	18"
Adjustment	18"
Shut Height	54"
Strokes, per minute	15
Bed Area, F to B X R to L	60"x84"
Capacity	315 tons

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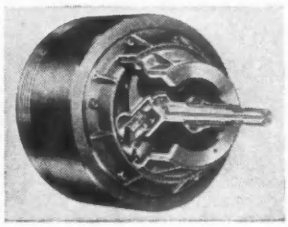

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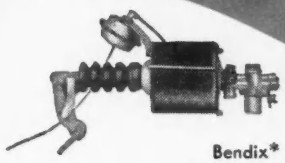

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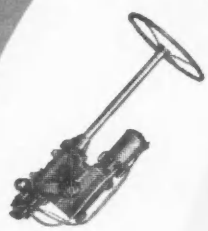

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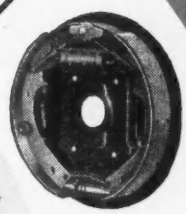

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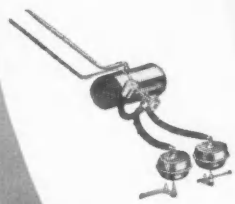
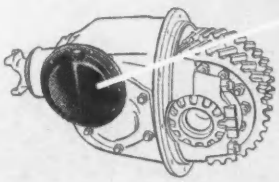
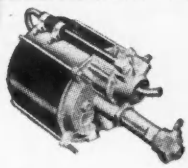


B-K* Power Braking System for Cargo Trailers





Hydrovac* Power Brake for all types of trucks

BENDIX VACUUM-POWER SHIFT

for two-speed axles—smooth, fast, easy!

Here's another control problem solved by Bendix Vacuum-Power! With a Bendix Vacuum-Power chamber on the axle and a "Preselector" control on the instrument panel (or gear shift lever), truck drivers get an easy, positive, fast-acting, *power* shift. A flick of the finger and intake manifold vacuum does the actual work of shifting! Low original and maintenance costs make it your logical choice.

This Bendix Vacuum-Power Shift has proved a worthy companion to Timken-Detroit's great line of 2-speed truck axles, with a record of many years and billions of miles of dependable performance.

BENDIX PRODUCTS
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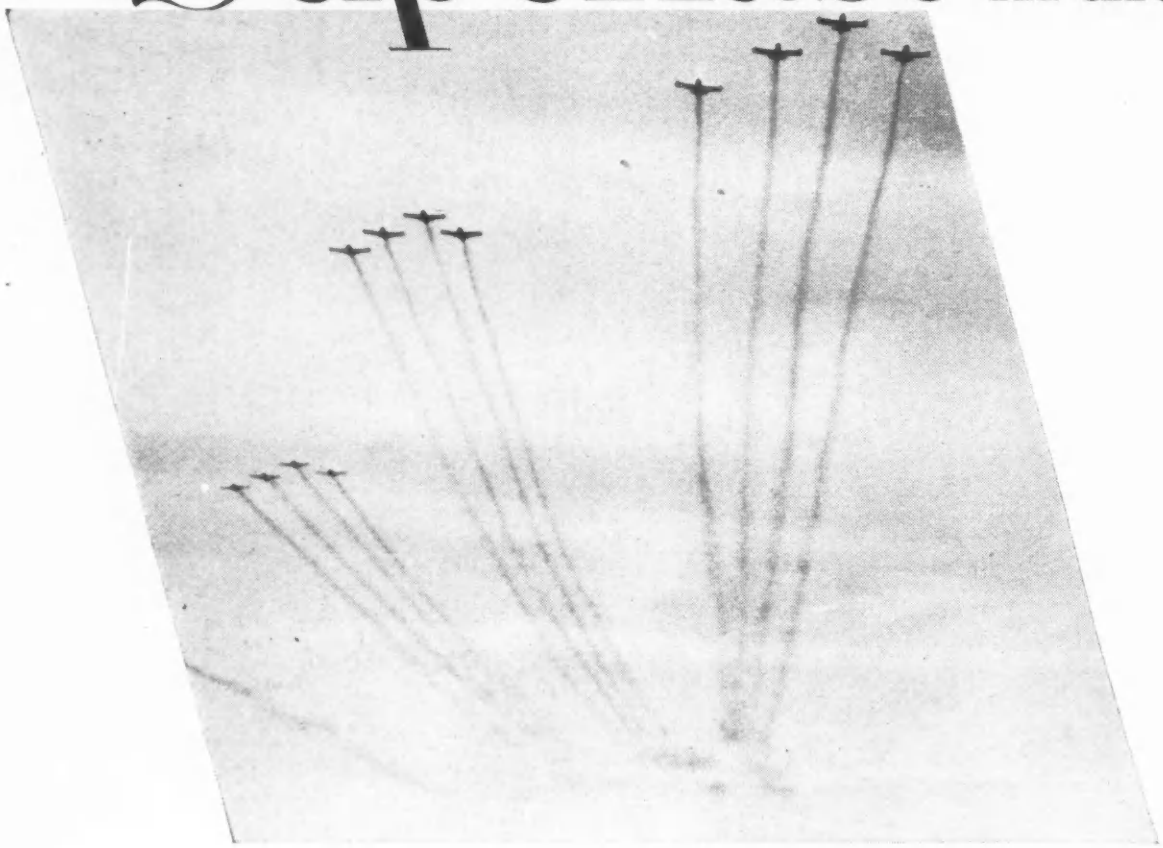
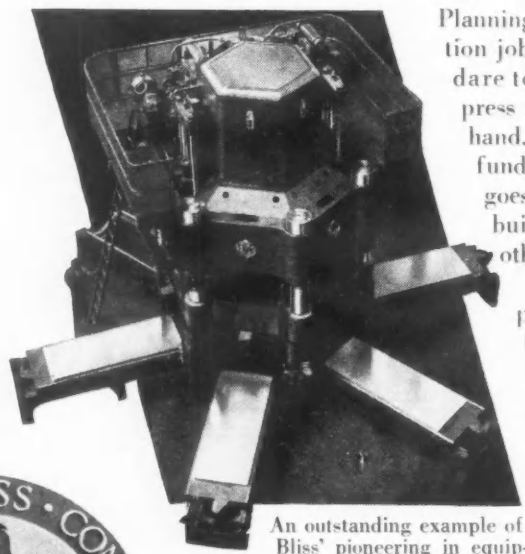


but what about production?



An outstanding example of Bliss' pioneering in equipment for the aircraft industry is the patented 2500-ton Six Die Slide Press used by many aircraft builders to produce a variety of sheet metal parts. Dozens of dies are kept in constant operation, as 24 operators simply load and unload. Interlocked control of any slide sequence is provided. No master operator needed.

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HEAT-TREATED STEEL

J&L STEEL

Leading Dump-Truck Body Builder Pioneers Use of Heat-Treated Steel for Bottom Plates

Hockensmith Corporation, Penn Body Division, of Penn, Pa., puts real meaning in its slogan: "*Strength · Service · Economy*" by using J&L Jalloy and Otiscoloy steels.

J&L Heat-Treated Jalloy for truck bottoms resists the terrific shocks and abrasion encountered in heavy-duty operations, while J&L Otiscoloy High-Tensile Steel frame members and other parts reduce dead-weight to a minimum without sacrificing strength.

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J&L Jalloy is a *modern* steel for products that must be tough and strong—heavy-duty truck bodies, power-shovel buckets, dump-cars, bulldozers, scrapers, rock crushers, sand-blast equipment, and wherever abrasion is a limiting factor in the life of a product.

J&L Jalloy—a fine-grain, heat-treated steel—has an inherent ability to withstand impact and abrasion. A wide range of physical properties, with strengths up to *155,000 lbs. per sq. inch*, are available.

If you need a steel with *better* abrasion resistance, or if you want longer life from products made of steel, let us send you data on J&L Jalloy, including information on properties, heat-treatments and workability. The data booklet: "Jalloy—J&L Alloy Steel" is available on request. Use the coupon.

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Jones & Laughlin Steel Corporation
Room 430, Jones & Laughlin Building
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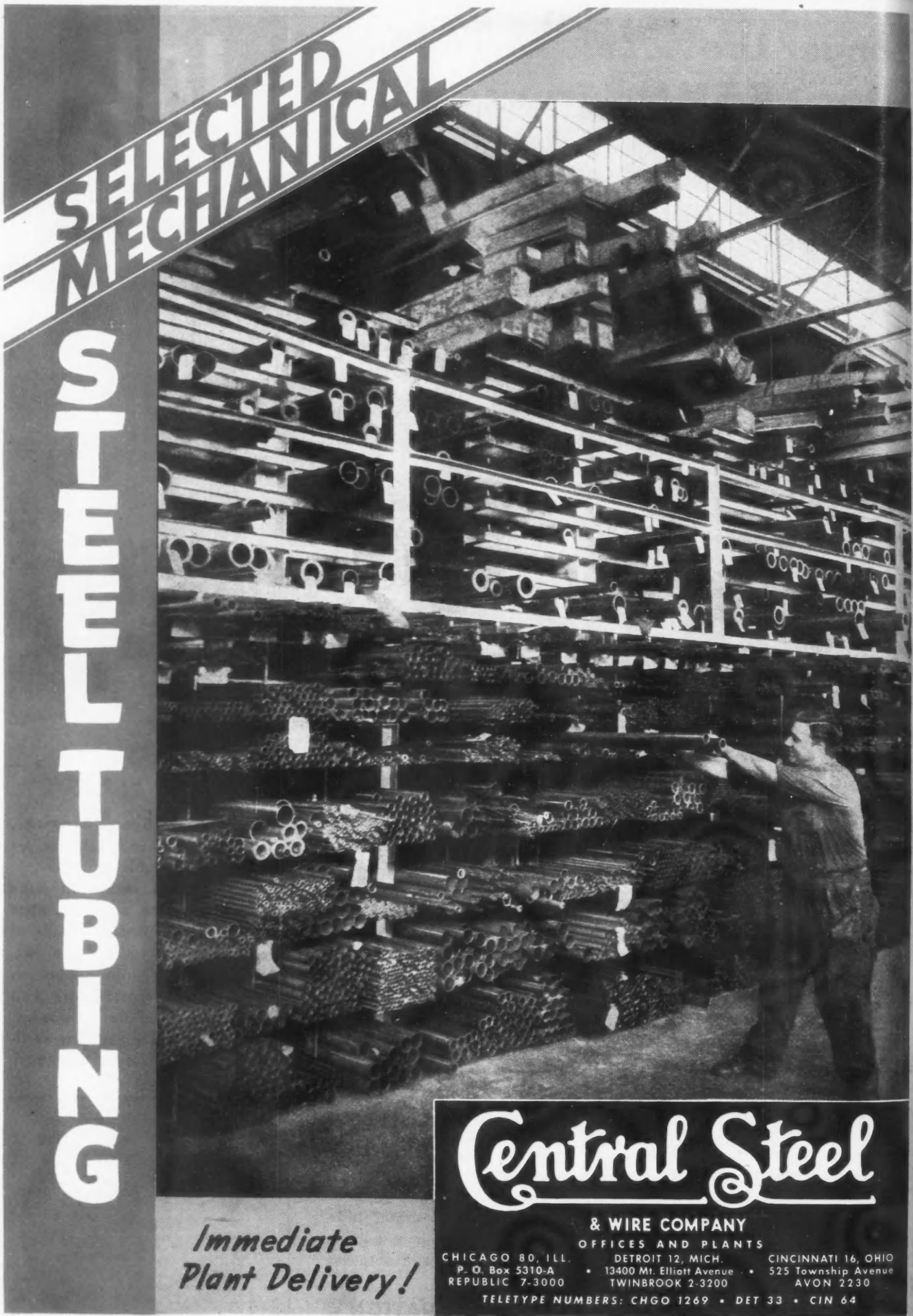
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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

Chaos from Bureaucratic-Made Confusion in Pricing

By making questionable all pricing methods other than F.O.B. mill selling the Federal Trade Commission and Supreme Court have created serious dilemmas ably discussed in this timely article by William Simon, chief counsel of the Trade Policies Committee of the United States Senate. The discussion appears on page 24.

Design and Performance of New GM Torque Converter

The new GM torque converter is now in production as a complete self-contained engine converter unit for use with Detroit Diesel Division Series 71 engines. Charts plotting full throttle performance, torque absorption and horsepower characteristics of the converter are given in this article, on page 26.

Oldsmobile Styling; Power Plant; and Carburetor

Three stories in this issue are devoted respectively to Olds futuramic styling now extended to all 1949 models; the new eight-cylinder 303 cu. in. V-type power plant developing 135 hp with 7.25 to 1 compression ratio featuring overhead valves and hydraulic valve lifters; and the entirely original design of the new Rochester carburetor. Turn respectively to pages 29, 30 and 34.

Greater Capacity Presses to Aid Stretch Forming

The group of materials stretchable over contoured dies now includes all of the soft aluminum alloys, 24S-T, 75S-O and corrosion resistant steel annealed and ½ hard. J. J. Sloan, production design engineer, North American Aviation, Inc., speaks of stretch forming advantages, difficulties, and techniques, starting on page 38.

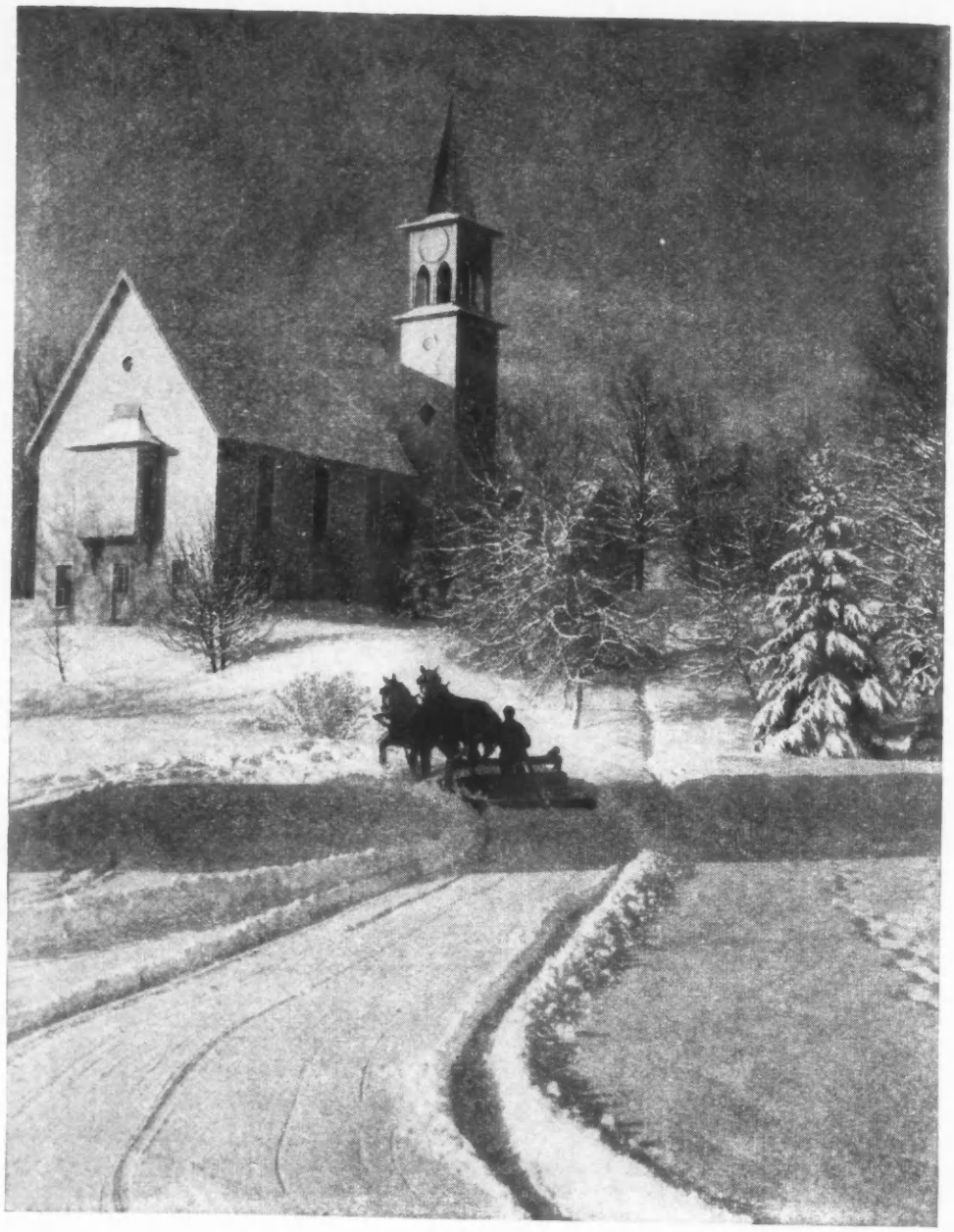
Important Engineering Developments

Abstracts from five technical papers from recent SAE meetings are concerned with piston ring and cylinder wear in Diesel engines; thermal efficiencies in internal combuston engines; design and performance in air brakes; new features in heavy duty brakes; and applications of hydraulic transmissions in tractors. Papers are reviewed, beginning page 42.

32 New Product Items And Other High Spots, Such As:

Reorganization of the Japanese automobile industry on a limited basis; the British "Big Six" Combine; and the Houdaille-Hershey's newly-operating central research laboratory.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3



Pathway to Peace

Peace is many things. It is the harmony of nations, the unity of peoples, the comfort of a home—the quiet beauty of a country church at Christmas time.

An intrinsic part of peace is industry. For in industry lie the potent seeds of progress, the hope of prosperity, the way to better living.

We always endeavor to contribute, to the best of our ability, to these ends.

To you, our customers and friends, we extend our good wishes this Christmas time. We shall appreciate your continued patience and understanding during the coming year. And, together, may we make our small contribution toward the pathway of peace.

JOSEPH T. RYERSON & SON, Inc.

RYERSON STEEL

NEWS of the AUTOMOTIVE INDUSTRIES

Vol. 99, No. 12 December 15, 1948

Car and Truck Production Close to All-Time Peak

With two weeks to go, automobile and truck manufacturers in the United States had already turned out this year more cars and trucks than they built in all of 1947. At the end of November, output stood at 4,795,327 units, about 2000 lower than the total production last year, and by mid-December, five million units had rolled off assembly lines. Production is humming this month at a high rate, and forecasts indicate production by year-end of somewhere in the neighborhood of 5,250,000 to 5,275,000 units. If that total is reached, it will be only from 75,000 to 100,000 units less than the all-time record made in 1929. Truck production, however, has already established a new high and by year end is expected to total about 1,380,000 units.

K-F Buys Willow Run Plant for $15.1 Million

For $15.1 million, the Kaiser-Frazer Corp. has bought the Willow Run, Mich. plant that it has been leasing from the WAA. Involving about 320 acres of land and 35 buildings, with total manufacturing and office space of over 4.5 million sq ft, the purchase was effective Dec. 1. 1948. The terms of the purchase call for an initial payment immediately of $1,510,000, with the balance of $13,590,000 payable in 20 equal annual installments starting Dec. 1, 1949.

Oldsmobile to Offer Model 88 Early in 1949

At a press preview of its 1949 models, Oldsmobile has confirmed that it will offer a new series 88 sometime after the first of the year. This model will have the same chassis and body as the new Oldsmobile 76, but will feature the new 135-hp, V-8 engine, and will be priced substantially under the larger 98 series. Oldsmobile also has a new hard top convertible called the Holiday coupe, which it will announce sometime next year. This car has a solid steel top with no side pillars, and windows which lower into the body leaving an unbroken open area from the windshield pillar back to the rear quarter panel. Oldsmobile is planning to double the capacity of its new V-8 engine plant using the same basic type of automatic equipment currently in production. It estimates that it will require eight to ten months to double capacity after the project is approved. However, no new building will be required. The present capacity of the engine plant is 30 an hour, whereas assembly line output is running close to 60 an hour, with about two-thirds of production scheduled to take the V-8 engine.

GM to Complete Change to '49 Models by Jan. 20

By Jan. 20 all automobile manufacturers except the Chrysler Corp. will have announced their 1949 models. Oldsmobile will make its model announcement Dec. 19, and Pontiac and Chevrolet will announce by Jan. 20. Studebaker will also bring out a 1949 model early in January, as will Packard. The latter two, however, will not be greatly changed since they have already switched to postwar styling. It is believed that the Chrysler line will appear in February, with Dodge possibly the first to be displayed. The four Chrysler lines will have entirely new styling and will complete the postwar changeover in the industry. The complete GM line will be shown to the public in New York from Jan. 20 to 27, with all of the trappings and fanfare that accompanied the prewar automobile show.

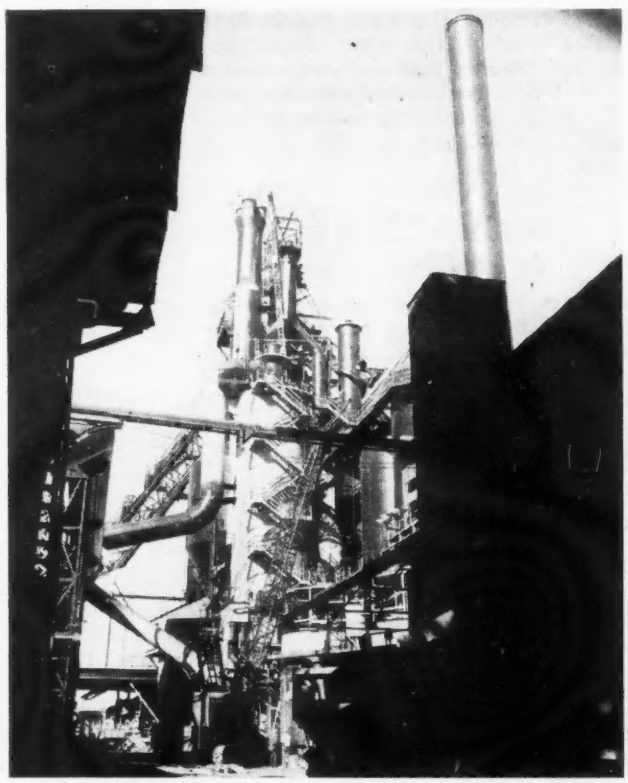
The show's theme will be "Transportation Unlimited," and in addition to the complete automobile display, developments in the aviation jet engine, Diesel marine, railway, truck and coach fields will be exhibited.

Dodge Reported Planning Two Wheelbase Series

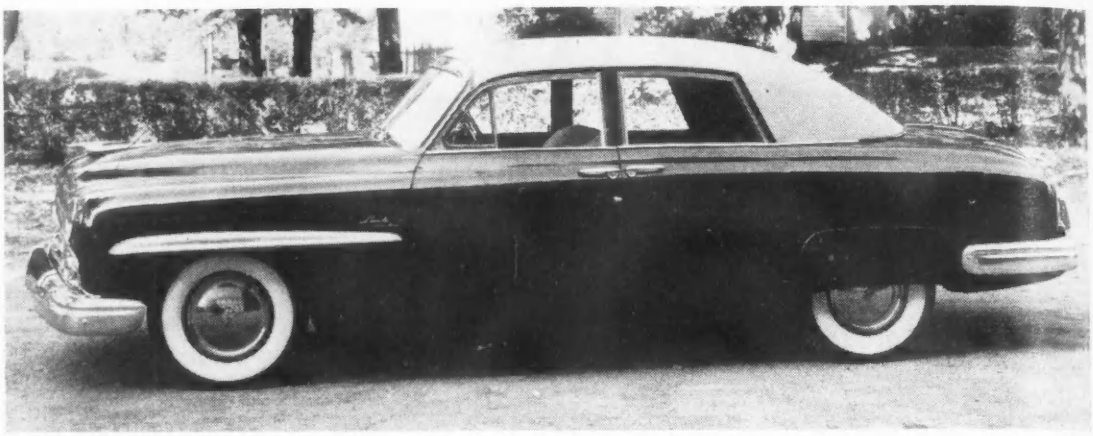
It is understood that Dodge next year will have two lines of cars on

FURNACE FOR FORD

Recently completed at the Ford Motor Co.'s Rouge plant, this new 226-ft high blast furnace, reportedly one of the largest iron smelters in the world, has been named the "William Clay Ford." With a daily production capacity of between 1300 and 1400 tons of iron, this furnace will about double Ford's present output of basic iron. The hearth's diameter is 27.5 ft.



DERHAM DISTINCTION



This Lincoln Cosmopolitan sports sedan has been revamped by the Derham Custom Body Co., Rosemont, Pa., by eliminating the two side quarter windows, installing a small oval rear window, and covering the steel roof with a tan fabric, thus combining the appearance of a convertible with the advantages of a hard top model.

different length wheelbases. This would tend to confirm reports that there may be more of a price spread between the Dodge Deluxe model and the higher priced Custom than has existed in the previous models. It is also reported that the Chrysler Div. will label its 1949 model as the Silver Anniversary Chrysler since next year will mark the 25th anniversary of the Chrysler car even though the Chrysler Corp. was not formally organized until 1925.

Ford Trucks Now Being Titled "1949"

No mechanical or other changes are involved in a recent announcement that effective Dec. 1, all Ford trucks were being designated as 1949 models. J. R. Davis, Ford vice president of sales and advertising said that only engine prefix and truck model designations were changed, and that the series designation, from F-1 through F-8, would remain the same.

Nash Nets $20 Million In 1948 Fiscal Year

A new high in sales was reported by the Nash-Kelvinator Corp, for the fiscal year ending Sept. 30, 1948. Net earnings of Nash-Kelvinator and its subsidiaries for the 1948 fiscal year amounted to $20,132,954 as compared to $18,097,697 for the preceding year, while net sales totaled $302,860,264 in the 1948 period, as against $250,262,581 a year ago.

Piper Aircraft Corp. Buys Convair's Stinson Div.

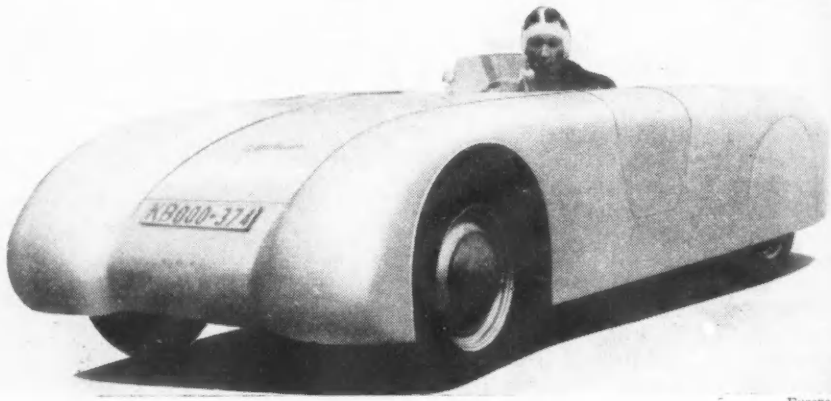
Involving the sale of all equipment, tools, spare parts, and finished planes, but not the Stinson plant at Wayne, Mich., the sale of Consolidated Vultee Aircraft Corp.'s Stinson Div. to the Piper Aircraft Corp. was recently disclosed. This sale will integrate into a single manufacturing and sales organization two non-competitive lines of planes. Piper Aircraft will consider the change of the name of the corporation to the Piper-Stinson Aircraft Corp. at a shareholders' meeting on Jan. 18. As soon as the necessary equipment, tools and parts can be transferred from Wayne, Stinson's manufacturing operations will be moved to Lock Haven, Pa.

October Factory Car Sales Highest Since June, 1941

October factory sales of passenger cars from U, S. plants hit the highest point since June, 1941, according to the AMA. The output of 383,756 units in October was 27 per cent higher than the number of cars produced in the month of September. For the first 10 months of this year, the total vehicle output for the industry was more than 4.3 million, or about 10 per cent ahead of the same period last year.

Hudson Broadens Policy on Accessory Loading

The Hudson Motor Car Co. has broadened its retail sales policy to insure the public an opportunity to purchase cars without extra equipment, trade-ins or any special consideration. The company has advised its dealers that they are to order 50 per cent of all Super models without extras, and are to offer the cars that way to the public. The only exceptions are bumper guards, heaters, and oil bath air cleaners which may be ordered by dealers in territories where cleaners are a necessity. Furthermore, all dealers are to display these cars without extras of any kind. In addition, dealers are told to sell all Hudson cars: with or without trade-in with a fair market price allow-



European

PRACTICING GERMAN

Literally called "the small fry," Der Nachwuchs, a new German racing car, powered by an aircooled 42-hp engine, has been built for use as a practice racing car. The Nachwuchs developed a speed of about 88 mph in its trial run.

ance whenever a trade-in is involved; at not to exceed factory delivery prices suggested by the company; for cash or time payments; and with no special consideration whatever. The policy on extras applies equally to non-equipment items such as undercoating and polishing jobs. The program goes into effect on cars delivered after Jan. 1.

More Steel in Postwar Automobiles

Part of the reason for increases in car prices today over those in prewar years is given in a recent statement by the American Iron and Steel Institute which stated that new models of popular postwar passenger cars require an average of about 200 lb more steel than late prewar models, and up to 1000 lb more than those in the early 1930's. The increased weight from year to year of numerous makes has been especially pronounced among low-priced cars. In 1933 the three most popular cars had an average shipping weight of less than 2700 lb, based on four-door sedans. From 1933 to 1941 the weights of these cars rose steadily to an average of slightly more than 3000 lb. In 1946, average weights of the three top selling cars in the lower price field were substantially above 3100 lb. Although weights were reduced slightly in some 1947 and 1948 models, the average for the three remained higher than at any time prior to the war, and was 472 lb heavier than it was 15 years ago. Although steel is only one of 30 or more materials entering directly into the construction of a car, it constitutes about 69 per cent of the completed car weight of a typical model.

Six British Car Makers to Standardize Parts

Six leading British automobile manufacturers, producing about 90 per cent of the automobiles made in Great Britain, have agreed wherever possible to standardize parts in order to speed up their output. The Austin, Rootes, Nuffield, Ford, Vauxhall, and Standard concerns are the six participants. Indicative perhaps of the importance of the American market, Austin has reportedly engaged Raymond Loewy Associates, American industrial designing firm, to design its 1950 models. Austin's passenger and commercial vehicles are expected to be radically revamped by the Loewy firm which designed the new Studebaker.

Buick to Triple Dynaflow Output by Next March

With current output of Dynaflow transmissions running at a rate of 450 a day, GM's Buick Motor Div. is planning to triple its production of these units by next March, Ivan L. Wiles, Buick general manager, stated recently.

Underscoring this, GM's Allison Foundry, Bedford, Ind., will employ a record 1400 persons within the next few weeks in an effort to keep pace with the demand for Buick Dynaflow automatic transmission assemblies, according to C. M. Jessup, general manager. The current payroll is 1150 persons, as compared to the wartime peak of an average of 900. Mr. Jessup reported that an additional 35,000 sq. ft. of plant floor space is being constructed in small buildings to provide more manufacturing and shipping room.

Twin Coach Producing Parts for Grumman Aircraft

A multi-million-dollar aircraft order has been received by the Twin Coach Co., Buffalo, N. Y., from the Grumman Aircraft Engineering Corp., Bethpage, N. Y. The order will raise the Buffalo plant's present volume of aircraft orders to about $6.5 million, and will result in an increase of about 33 per cent in the plant's employment. The present order calls for the Buffalo plant to act as a subcontractor for the manufacture and assembly of wings and major control surfaces for planes produced by Grumman. Twin Coach has still 120 buses to be built before the aircraft work can fully get under way. Now producing three coaches a day, the plant will continue at this rate until present orders are completed.

"The broad entry of the company into the aircraft field does not mean the Buffalo plant is out of the bus business, but rather that the high aircraft skills of the Buffalo plant's personnel make it imperative that the local organization take on this contract and let Twin Coach's Kent, O., and Ft. Erie plants concentrate on buses for the present," John J. Lee, vice president and general manager of Twin Coach, explained.

GM Not to Increase Its Cost-of-Living Pay

As predicted on page 23 of the Nov. 15 issue of AUTOMOTIVE INDUSTRIES, GM has officially announced that both salaried and hourly-rated employes will continue to receive the same cost-of-living allowance during December, January and February that they received during the previous three-month period, September, October and November. For approximately 270,000 hourly-rated employes, this cost-of-living allowance will continue to be eight cents an hour. Under GM's current wage adjustment formula, the drop in the cost of living during the last quarter was not sufficient to require any change in the cost-of-living allowance.

Ford Plant in Germany Makes First Postwar Car

More signs of awakening industrial life in Germany is seen in a recent announcement by the Ford Motor Co. that the first Ford passenger car made in

REGAL RIVIERA

Buick's new custom Riviera, scheduled for production in late spring next year is to be built on the Roadmaster chassis and equipped with Dynaflow Drive as standard equipment. With a permanent all - steel top, the Riviera, displaying the lines of a convertible, has a rear window of curved glass extending around the rear corners of the car.

NEWS *of the* AUTOMOTIVE INDUSTRIES

ONE FOR THE ROAD

Equipped with a wrecker power crane mounted on a heavy-welded steel body, this new Nash road service truck is now being produced in limited quantities by the Nash Motors Div., Nash-Kelvinator Corp., for the exclusive use of Nash dealers. Nash officials shown left to right are F. G. Sease, assistant general sales manager; H. C. Doss, vice-president in charge of sales, and W. A. Cook, truck and commercial manager.

Germany since the war recently rolled off the assembly line in Cologne. Ford plans to make 150 of these small four-cylinder models a month in this plant, which since 1946 has been producing trucks.

Continental Takes Over WAA Plant in Muskegon, Mich.

Continental Motors will take over the WAA-owned plant at Muskegon, Mich., which Continental Aviation & Engineering Co. used during the war. Production is expected to start after Jan. 1. Continental has also purchased a war surplus engine plant at Detroit from the WAA. The price is said to be $126,000. Coninental had been operating the plant under lease for production of engines. It has a floor area of 32,500 sq ft.

RFC Rejects Tucker Loan Application

The RFC reports that it has denied an application for a $30 million loan sought by the Tucker Corp. The loan was turned down early in November.

Sloan Honored for Service to Highway Transportation

For his work as chairman of the National Highway Users Conference, Alfred P. Sloan, Jr., chairman of the board of GM and chairman emeritus of the NHUC, was recently presented with a scroll of appreciation, signed by the chairman of each of the state highway users conferences and by the entire membership of the conference's board of governors and administrative committee, for his services to highway transportation. The presentation was made by Arthur M. Hill, Washington, D. C., chairman of the National Security Resources Board, who as president of the National Association of Motor Bus Operators, an NHUC affiliate, has long worked with Mr. Sloan in NHUC affairs.

Packard Production Near All-Time High

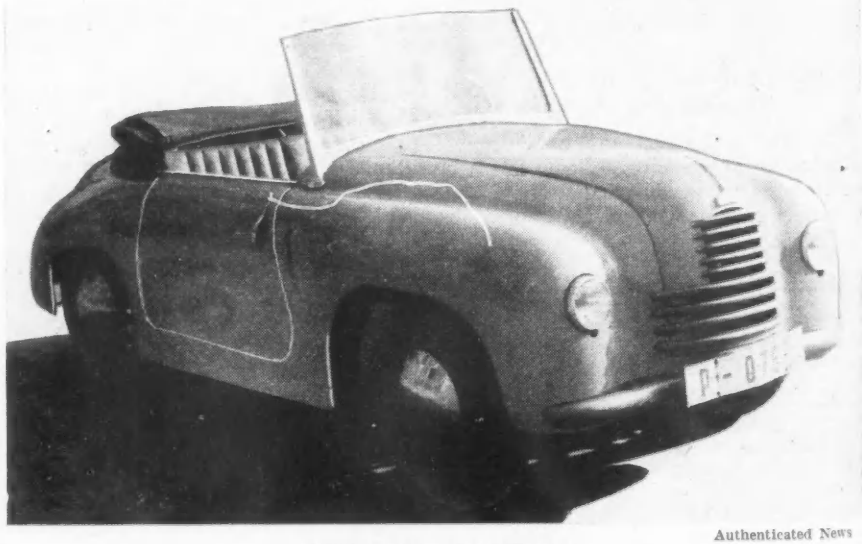
The Packard Motor Car Co. expects to have the second best production year in its history in 1948. Through October, Packard had produced 86,991 cars, and with production expected to continue at a high level during December, output will be somewhere between 95,000 and 100,000 units this year. The all-time production peak was 109,518 cars in 1937.

Goodrich Steps Up Output of "Cold Rubber"

"Cold rubber" continues to make news. The B. F. Goodrich Chemical Co. has announced that the capacity at the plant it operates for the government at Port Neches, Tex., will be increased so that 30,000 tons of this new type of rubber can be produced annually.

Oldsmobile Raises Prices of 1949 Models

Hard on the heels of price increases announced by Buick and Cadillac, GM's Oldsmobile Div. has announced that



Authenticated News

MINICAR FOR TWO

Another "People's Car" has been reported from Czechoslovakia. Shown here is the two-seater Minicar, designed by R. Vykoukal. Powered by a two-cyl engine developing about 10 hp, the Minicar has a maximum speed of about 46 mph. It is about 10 ft in length.

prices of the 1949 Oldsmobile Series 76 models will be boosted $45 to $60, and that the Series 98 will be hiked $360 to $370. The latter series includes as standard equipment the new Rocket engine, GM Hydra-Matic Drive, directional signals, and windshield washers. Production of the Series 66 and 68 Oldsmobile line has been discontinued for 1949.

Fisher Body to Award $65,000 for Best Car Models

A classic annual event in the automobile industry, the Fisher Body Craftsman's Guild 1949 model car competition will offer $65,000 in cash awards and university scholarships to boys throughout the nation who can design the best model automobiles. In announcing the new contest, T. P. Archer, GM vice president and Guild president, said that the deadline for finishing model cars is midnight July 1, 1949.

Chris-Craft to Build New Outboard Motor

The Chris-Craft Corp. has built a new plant at Grand Rapids, Mich., where it will produce outboard motors. It is understood that tooling for production of 1000 motors a month has been completed, and that production will get underway within the next few weeks. An announcement of the new motor and the company's sales policy is expected within the next 60 days.

1949-50 Defense Budget Will Hit Automobile Industry

The outcome of the current battle by the Armed Forces for a large increase in their budget for defense spending for the 1949-50 fiscal year will have an important bearing on the automobile industry. As it is, the currently proposed $15 billion program is certain to be felt much more next year than in 1948, because many of the programs are just getting started, and others of major size will be coming into the picture next year. Military leaders are asking for about $23 billion, which is more than half as large as the entire budget for all government operations during the current fiscal year. If the added billions are granted, orders for aircraft, ships, tanks, military vehicles and other heavy equipment would certainly be increased greatly, cutting into the supply of steel and other materials available for civilian use. It is still too early to tell what the effect of the defense program will be on next year's automobile and truck production, but it is hard to see how any sizable program can fail to seriously affect the chances for any increase over 1948 since materials are already in short supply in relation to demand.

GM's Central Foundry Closing Plant in Lockport, N. Y.

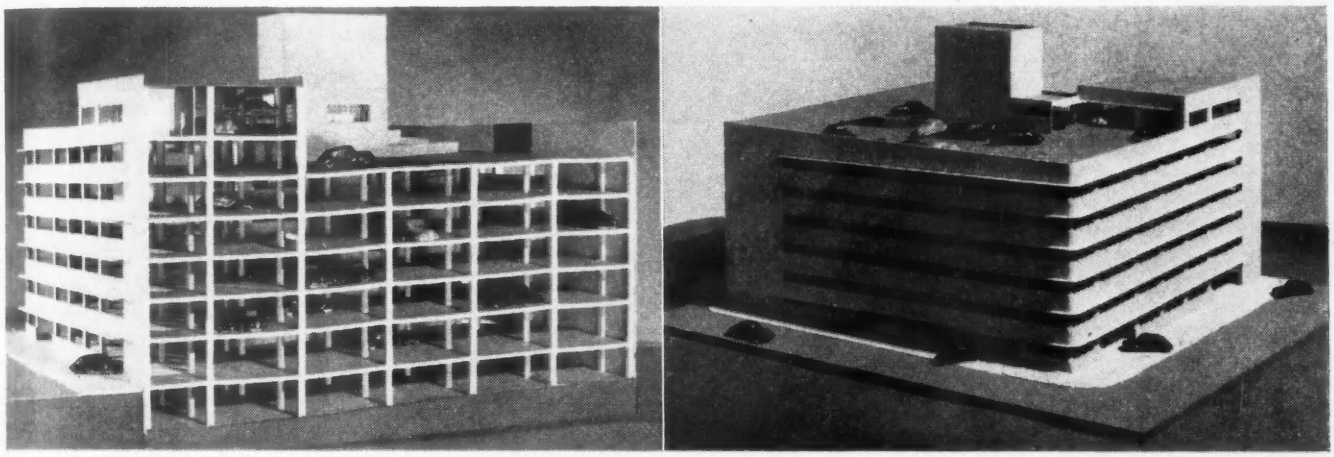
GM's Central Foundry Div. is going to close its foundry plant in Lockport, N. Y. It is expected that the plant will be sold or leased. Operations will be suspended as soon as arrangements can be made to complete the manufacture of products and materials now in process, probably within some 60 to 90 days. The plant has been manufacturing gray iron castings.

GMC Truck & Coach Boosts Prices

Price advances to cover increased manufacturing costs have been announced by M. D. Douglas, general manager, GM's Truck & Coach Div. The increases range from $90 to $175 on GMC chassis in the light and medium duty truck line, while all cabs for these models have been increased $10. The prices of standard bodies have not been raised with the exception of panels which have been increased $50.

Polk Reports Decline in Car Registrations

R. L. Polk & Co. reports a significant decline in passenger car registrations in October on the basis of figures compiled from 36 states. Polk estimates that total passenger car registrations in the United States for October will approximate 287,000 units, which would be the lowest since June of this year. The Polk figures substantiate reports from observers in the industry



AUTOMOBILE FACTS, Automobile Manufacturers Association

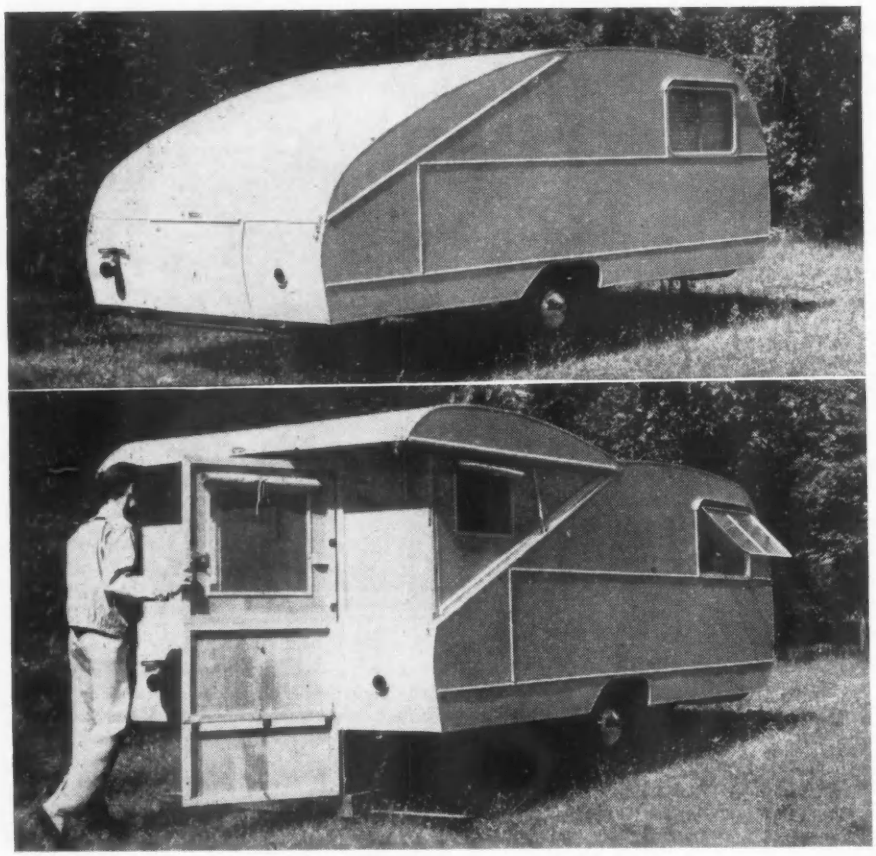
PARKING ON THE UP AND UP

This unique parking building currently under construction in downtown Los Angeles, Calif., is designed to accommodate 500 cars. The building is essentially a continuous floor 60 ft wide which spirals upward at a slant of 4 deg, giving in effect seven floors of parking space. A two-way traffic line winds up the center of the floor with a continuous row of parking stalls on each side of the lane. A central core houses elevators for access to the various levels.

that there has been a slight easing of demand for new cars over the past few weeks. This has been especially noticeable in the higher-priced lines. Polk observes that the leveling off of sales during October cannot be traced to any one particular reason, but rather that it is due to a number of conditions including material shortages, strikes in supplier plants, new model car changeover, reestablishment of credit controls, and possibly other factors, such as normal seasonal decline.

U. S. Automobile Exports Drop Below Last Year

Exports of passenger cars and trucks from the United States are below the level prevailing last year. During the first ten months of this year, 198,227 passenger cars and 169,425 trucks went to foreign buyers, compared with 217,600 passenger cars and 216,981 trucks during the same period of 1947. Passenger car exports dropped from 7.7 per cent of total U. S. production during the first ten months of last year to six per cent for the same period of 1948. Truck exports during the same two periods dropped from more than 21 per cent to about 14.7 per cent.



SPORTING COMBINATION

Called the "Wee-Zim," this new trailer unit, built by the Zimmer Boat & Trailer Co., Detroit, Mich., measures 15 ft, 8.75 in. overall and has a body length of 13 ft, 6.75 in. It features a roof hinged at the forward half permitting it to be folded down in transit, and lifted when parked to give increased headroom.

British Austin to Issue Stock

The Austin Motor Car Co., Ltd., of England is going to issue 2.5 million ordinary or A shares at five shillings each. These are a subdivision of 625,000 ordinary and unissued one pound shares. This issue is necessary in view of recent extensions, particularly the purchase of the controlling interest in the Austin Motor Co., Australia, where bodies are now being manufactured for chassis exported from England.

Americans Order 15,000 New British Veloce Motorcycles

Orders totaling $2 million for a new lightweight motorcycle, the Velocette 149, now being manufactured by Veloce Ltd., Birmingham, England, have been received from buyers in the U. S. Shown for the first time at the Earl's Court Exhibition, held Nov. 18 to 24, in London, at least 15,000 of these new motorcycles will be shipped to the United States.

Armed Services Ask GM Help on Aircooled Engines

GM has been requested by the armed services to develop a line of aircooled engines similar to those developed by Continental Motors in cooperation with Army Ordnance. The GM project covers engines ranging down from 125-hp, the lower level of the Continental line which goes up to 1040-hp.

K-F Leases Warehouse In Chicago Suburb

The Kaiser-Frazer Corp. has arranged for the lease of a parts and accessories warehouse depot in Franklin Park, Ill. The warehouse will be erected by Wilbur E. Howett Co. of Chicago for approximately $1.1 million. It will be situated on a 10-acre site, will provide 218,000 sq ft of storage and shipping facilities, and will be completed in about nine months.

Labor to Aid Fight On FOB Pricing

Organized labor as well as management is vitally interested in having Congress clarify recent legal decisions regarding FOB mill pricing. As a result of union interest, management may get some support in its fight on the pricing system. Union spokesman testifying before the Capehart Committee urged congressional action on the pricing decisions, pointing out that it would be impossible for most workers affected to migrate to new locations along with industry which might have to do so because of the FOB pricing ruling.

Replacement Parts Output Down 20 Per Cent

Replacement parts manufacturers have experienced a decline of about 20 per cent in production during the past year, according to Frank Rising, general manager, Automotive & Aviation Parts Manufacturers, Inc. He said the reason is that shelf inventories have been largely filled, and that parts demand has declined somewhat from the peak of the immediate postwar period.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Boeing Now Building B-47 Stratojet

The U. S. Air Force has given the "go" signal to the Boeing Airplane Co. for the production of the Boeing B-47 Stratojet in the form of a letter of intent to contract for an initial quantity of 10 airplanes. Now going into production at Boeing's Wichita Div., Wichita, Kans., the Stratojet has a wingspan of 116 ft, a length of 108 ft, and is powered by six turbo-jet engines and 18 JATO rockets for heavy take-off and emergency use.

One-Fourth "No Union" Votes In NLRB Elections

According to a report from NLRB, employes voted for "no union" in more than one-fourth of the collective bargaining elections held during July, August, and September of this year. In 1943 elections results were: no union, 410; AFL, 550; independent, 270; CIO, 245; and intermediate, 18.

Government Drops Plan for Scrap Buying Agency

Plans for a single government agency to buy German scrap steel have apparently been abandoned. It is believed that conflict with anti-trust laws would make it necessary for Congress to legalize the plan before it could be used, and as a result it will be dropped.

Survey Shows Car Prices Up Less Than Housing

The AMA has made an interesting comparison between the rise in the prices of houses and automobiles since 1910. In that year a typical five-room house cost $1600, and the average automobile sold for $16 less. Today the same size house sells for about $9000, whereas the average automobile this year sells for $1714. When the $85 federal excise tax, which does not apply to housing, is subtracted, the price of the average automobile today is only $45 higher than it was in 1910. The AMA says that the reason for the disparity in the rise in price between the two items is that the automobile manufacturers abandoned hand tools in favor of production machinery to reduce costs, whereas housing still is built largely by hand tools and handwork, much as it was 40 years ago. Admitting that undoubtedly houses today are more compact, modern, and convenient, the automobile also has made great advances such as all-steel bodies, self starters, improved lighting, engines of vastly greater power and performance, much safer brakes, and shatter-proof glass.

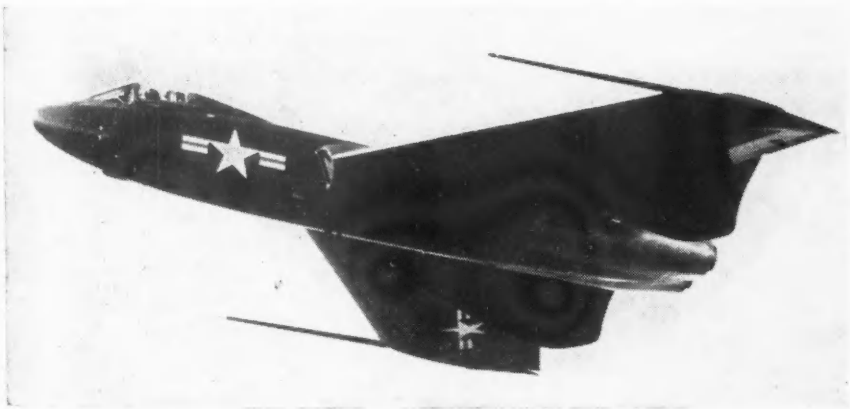
1948 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Totals 1948	Totals 1947
First Quarter	929,926	346,860	3,913	1,280,699	1,142,236
Second Quarter	845,938	358,324	3,412	1,207,674	1,208,411
Third Quarter	1,006,716	339,764	2,926	1,349,406	1,148,870
Total—Nine Months	2,782,580	1,044,948	10,251	3,837,779	3,497,517
October	383,756	107,352	724	491,832	436,001
Total—Ten Months	3,166,336	1,152,300	10,975	4,329,611	3,933,518

1948 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
First Quarter	869,324	60,602	291,354	55,506	3,060	853
Second Quarter	791,529	54,409	310,575	47,749	2,970	442
Third Quarter	945,388	61,328	289,667	50,097	2,673	253
Total—Nine Months	2,606,241	176,339	891,596	153,352	8,703	1,548
October	361,868	21,888	91,279	16,073	645	79
Total—Ten Months	2,968,109	198,227	982,875	169,425	9,348	1,627

* Automobile Manufacturers Association.



TAILLESS TWIN-JET

The Chance Vought F7U-1, a new Navy swept-wing, twin-jet fighter designed for carrier operation, has successfully completed its initial flight tests. Rated in the over 600 mph class, this plane is powered by two Westinghouse turbo-jet engines.

Goodyear Completes Mock-Ups of Airplane Cockpits

The Goodyear Aircraft Corp., Akron, O., has announced the completion of design and construction of four airplane cockpit mock-up models for the U. S. Air Force. These included models for a fighter plane, tandem bomber, cargo version, and a very heavy bomber. The project was conducted at Goodyear Aircraft under the direction of the Air Materiel Command in order to standardize the various crew-member stations in the four different type planes.

GM Unit to Market Hydraulic Valve Lifter

GM's Diesel Equipment Div. is planning to expand its market for hydraulic valve lifters beyond the boundaries of the GM realm. The company is currently making the valve lifters for the Oldsmobile and Cadillac V-8 engines, and for Buick for use in the Roadmaster and in the Super series engine when used with Dynaflow transmission. It is understood now that the division will design and manufacture the hydraulic lifters for any other engine manufacturer who wants to use them.

(*Turn to page* 88, *please*)

Economic Chaos Threatened by Bureaucratic-Made Confusion

Here Are Some of the Dilemmas Created by Federal Trade Commission and Supreme Court in Making Questionable All Pricing Methods Other Than F. O. B. Mill Selling

AFTER 25 years of litigating various phases of delivered pricing practices, the Federal Trade Commission achieved success in 1948 when the Supreme Court and Circuit Courts of Appeals affirmed its orders in the Cement Institute, Rigid Steel Conduit, and Pittsburgh-Plus cases.

The decisions in these cases and the arguments advanced by the Commission during those proceedings have enveloped in uncertainty all pricing practices, in industries where freight is a substantial part of the delivered cost, other than f.o.b. mill selling. Substantial numbers of businessmen now urge Congress to amend the law to permit uniform delivered prices, uniform zone prices, and freight equalization or freight absorption to meet competitors' lower prices, when such systems are practiced individually and not pursuant to a conspiracy or agreement.

It is my purpose to point out here the issues which must be decided by Congress, with respect to the validity of pricing practices. It is of the greatest importance that the Congress and the people clearly understand the issue, for otherwise the proper answer to the problem may not be reached.

Is the Commission's pricing policy limited to conspiracy cases? If so, there is no occasion for concern by any one. Not only is the Commission opposed to all conspired prices, but the Congress is and I am certain will continue to be unalterably opposed to all price fixing conspiracies, as are and will be, the overwhelming majority of the American people. In fact, opposition to conspired price fixing is almost as universal as opposition to sin.

Is the Commission's pricing policy limited to the question of who pays the freight bill? If so, the issue is not of vital importance to our American economy. Someone must always pay the cost of transportation, and it does not seem to be of controlling importance to our economy whether it is paid by the buyer or by the seller.

The real issue which we must face is: What will be the effect on our entire national economy of the Trade Commission's pricing policies? Will it be a beneficial or a harmful result? Will that pricing policy impair or will it promote our free enterprise American competitive industrial system?

It must certainly be agreed that we cannot afford to impair the economic structure of our country and endanger our competitive industrial system, except as a calculated risk to achieve economic gains which outweigh the foreseeable disadvantages. We must determine whether we can afford to impair the right of American businessmen to openly and freely compete with each other, when it appears that this can only be done through freight absorption or freight equalization.

For more than 25 years the Federal Trade Commission has opposed delivered pricing practices. In 1924 it entered an order against the subsidiaries of the United States Steel Corp., affirmed last month, that requires them to sell at f.o.b. mill prices.

In 1936 hearings were held before a Senate committee on the Wheeler Bill, which was expressly designed to outlaw uniform delivered prices and basing point systems. The present Chairman of the Federal Trade Commission then testified in support of the bill and the Commission urged that the bill be passed. But the Congress did not pass the bill.

At a later date, the Commission supported a definition of the word "price" in the proposed Robinson-Patman Act which would have defined the term as meaning what the buyer pays, after deducting the cost of transportation. The Chief Justice of the United States Supreme Court later said that had Congress passed the bill in the form recommended by the Commission, it would have outlawed all delivered price and pasing point systems. The Congress refused to

By William Simon
Chief Counsel,
Trade Policies Committee
of the United States Senate

in Pricing

pass the bill until that definition of price was stricken.

In 1941 the Trade Commission urged the Temporary National Economic Committee to enact legislation outlawing all basing point systems. The Commission then told Congress that for 20 years Government experts had been fighting the basing point system and that f.o.b. mill pricing was essential for competition in the steel industry. Again the Congress declined to pass such legislation.

(*Turn to page* 68, *please*)

Are Identical Prices Illegal?

THE Federal Trade Commission views identical prices as collusive and illegal regardless of whether they result from conspiracy or from competition. . . .

The Federal Trade Commission's October 12, 1848, statement of policy concludes that virtually all pricing systems, other than f. o. b. mill, are discriminatory and that they are illegal whenever those discriminations may be found to injure competition. . . .

If a newcomer to the business world were to adopt a new, novel and unheard of pricing policy, which violated no requirement of the law, it would nevertheless become illegal for him to use that pricing practice if a substantial number of his competitors determined that competition required them to follow the same pricing practice and they in fact did so. . . .

Billions of dollars of the money of American people have been invested in industrial facilities and railroad properties in the belief that uniform delivered prices and freight equalization were both morally and legally proper. Many of these investments may be impaired by a pricing philosophy which requires only f. o. b. mill selling.

The Congress must determine when, if ever, any seller is to be denied the right to compete for any business, in any market, with any competitor, under any pricing system including the absorption of freight, so long as he does not act pursuant to a conspiracy or agreement . . . Congress must determine what pricing practice will best promote our free enterprise competitive system.

Design and Performance of

New GM Torque

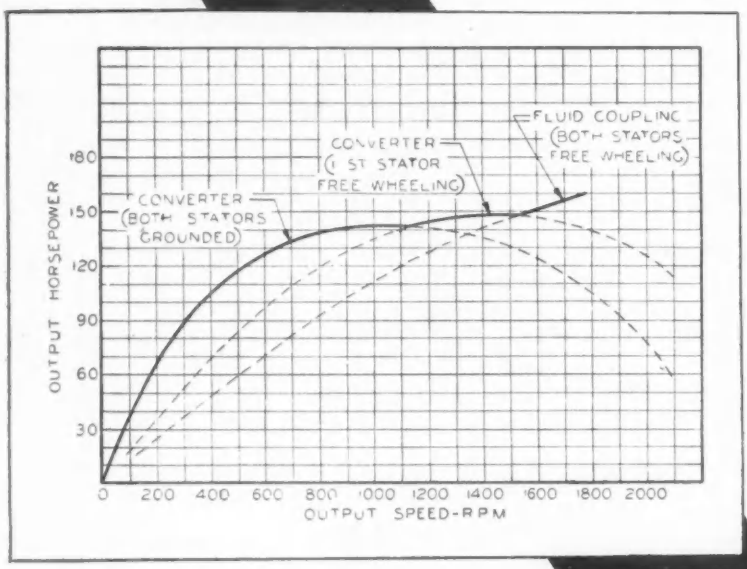


Fig. 1—Full Throttle Performance of Engine and Converter.

THE new GM torque converter, now in production at the Allison Division of General Motors, has been designed for use with Detroit Diesel Division Series 71 engines as a complete, self-contained engine-converter unit in a number of vehicle, industrial and oil-field applications. Complete units are offered in three, four and six-cylinder single engine, Twin-4 and Twin-6 models having engine ratings from 75 to 300 hp.

The converter consists of the pump, the turbine and two stators. These parts are heat-treated aluminum castings with blading predetermined and fixed for each model. The castings are machined to produce the necessary clearances and the converter pump casting, which must be fluid tight, is tested for leakage. Balancing of the pump is by means of coded weights, code numbers being stamped on the rim of the pump.

The converter housing attaches to the No. 1 SAE flywheel housing in the usual manner. In addition to providing support for the outer bearing, it provides the inlet and outlet connections for the fluid to circulate through the converter, and supports the sleeve on which the stators are located and on which the two overrunning units are operated.

The overrunning clutch assemblies each consist of an outer race, rollers, springs, and spring cups. Also included are the stator hub and bushings. Snap rings and thrust washers carry the end thrust of the stators. Hubs and outer races are riveted to the stator castings. Tickler springs push the rollers into engagement between the cam surface and the ground sleeve, and when coasting centrifugal force compresses the springs to release the rollers for reduction of friction.

Two shaft combinations are available; short coupled for direct drive in vehicle applications and a longer heavy duty shaft for general industrial installations. Shaft mounting is conventional with a pilot bearing in the flywheel and an outer bearing in a retainer attached to the housing.

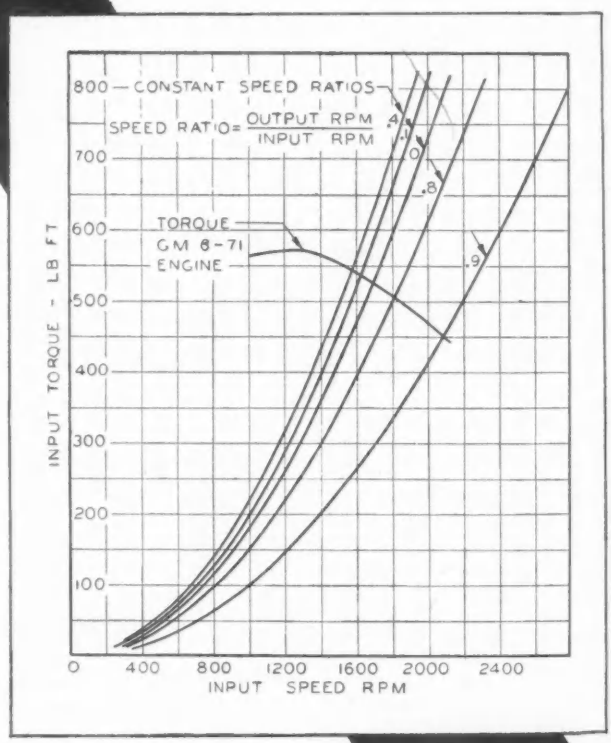
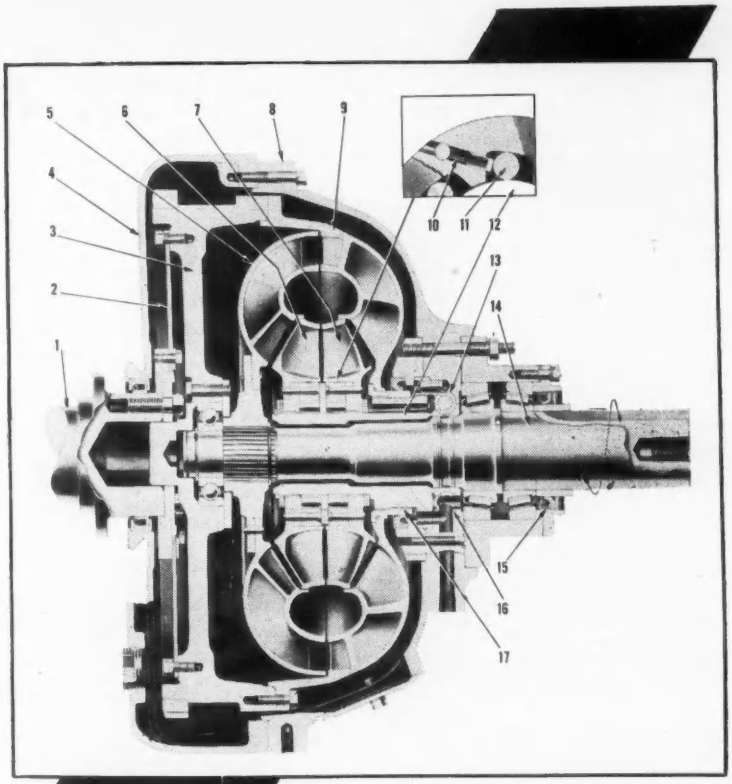


Fig. 2—Torque Absorption Characteristics.

By H. H. Roberts

Converter



Cutaway view of new GM torque converter

1. Engine crankshaft
2. Flexplate
3. Flywheel assembly
4. Flywheel housing
5. Converter turbine
6. First stator
7. Second stator
8. Converter housing
9. Converter pump
10. Roller spring
11. Freewheel roller
12. Converter ground sleeve
13. Oil supply inlet (New)
14. Converter output shaft
15. Outer lip type seal
16. Outlet to oil supply tank
17. Piston ring type high-pressure oil seal

The flywheel, however, is not mounted in the conventional manner, but is bolted to the converter pump and forms the back cover for the rotating converter assembly. It is supported on the crankshaft by a Flexplate which consists of a hub and a number of laminated disks. The Flexplate isolates converter thrust from the crankshaft, compensates for variations in the engine and converter dimensional stack, and absorbs angular variations due to misalignment in assembly and excess overhung loads.

Performance and Operation

Operation of the torque converter is fully automatic and it requires no attention from the operator. Blade angles deliver optimum performance under one certain set of conditions of input speed vs. output speed as conditions vary, and because no changing of blade angles is possible, the performance will drop on either side of the peak. This is partially compensated for by the free-wheeling of the stators in the GM converter, which in effect changes the angularity of the blades and provides three separate blade combinations. Typical full throttle performance of a power unit is shown in Fig. 1. The solid heavy lines show the combined output of the three separate blade combinations. The light dash lines combined with the solid lines show the characteristic performance over the entire speed range of a hydraulic unit having any one of the three combinations.

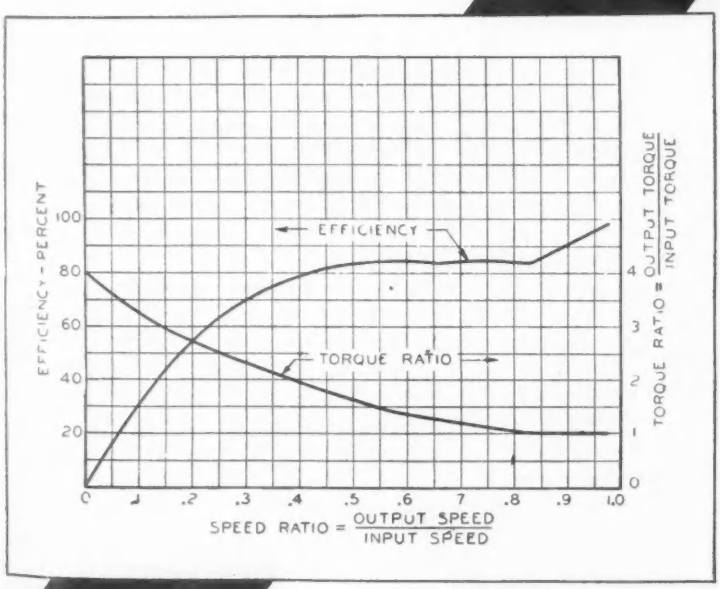


Fig. 3—Converter Performance.

The capacity of a converter, once established, is normally shown on an absorption curve (see Fig. 2). To match a converter to an engine, the engine torque curve is drawn through this curve to determine engine rpm and input torque corresponding to different speed ratios. A nearly constant engine speed regardless of output shaft speed, and also regardless of whether the load requires converter or coupling operation, is obtained by matching the converter to the engine.

Converter performance is usually expressed in efficiency plotted against speed ratio as shown in Fig. 3. Torque multiplication, commonly called the torque ratio, also is plotted on the same basis. Maximum torque ratio is obtained with the output

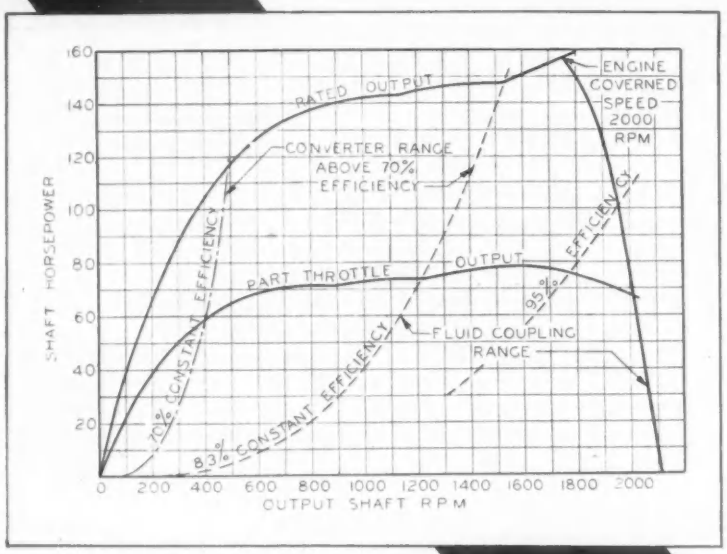


Fig. 4 — Horsepower Characteristics of General Motors Converter Power Unit (6 cylinder 71 Series Engine).

shaft stalled and determines the maximum drawbar pull obtainable.

The horsepower available at the output shaft at various speeds is not only a function of the converter efficiency but depends to a considerable extent upon proper matching of the converter to the engine. The GM converter is matched to the 71 series Diesel engines and therefore delivers the maximum power obtainable from the combination at the output shaft. In order to deliver maximum output horsepower, it is important to maintain high engine speed and thus high horsepower input from the engine over the entire range. The fluid coupling at the top range provides high efficiency at top operating speeds. This is said to be particularly effective at part throttle and light load operation since under these conditions the GM converter cycles through the converter stage very rapidly. It changes into fluid coupling range at low output shaft speed and continues to operate through the balance of the speed range as a fluid coupling, at high efficiency, as shown in Fig. 4.

The converter makes it impossible to operate the engine at full load except in the upper 25 per cent of its speed range. This protects the engine from lugging at low speeds and avoids excess fuel consumption that occurs when an engine is pulled down below its most efficient range of operation. The engine speed and torque characteristics (Fig. 5) show that they are nearly constant through the entire speed range of the unit.

Any heavy-duty SAE No. 10 viscosity oil can be used in the GM converter. Circulation of the oil through the converter and the cooler is obtained by means of a small charging pump located on the flywheel end of the engine. A charging pressure of 60-90 psi is maintained in order to circulate sufficient oil for adequate cooling and to eliminate any possibility of cavitation.

Two-stage seals are employed on the rotating parts to maintain high oil pressure in the converter. The high pressure seal consists of two pairs of piston rings in grooves. One pair is located inside and the other pair outside of the "ground sleeve" near the outer end. The small amount of oil which seeps past these rings from the high pressure side collects in an annular space in the converter housing and drains back to the oil reservoir. Leakage of oil from this annular space to the inside of the converter housing or to the outside past the power take-off shaft is prevented by common lip type seals. A synthetic rubber disk protects the outer lip type seal from dust and dirt.

The cooling provided to take care of the normal operating range of the converter is combined with the cooling system of the engine. The oil-to-water heat exchanger on the side of the engine, normally used to cool the engine lubricating oil, has been enlarged to house a second oil cooler element to take care of the converter.

The converter tends to rotate at near engine speed at all times and a certain amount of drag torque prevails even at idling speeds. Therefore, in order to shift gears behind the converter, a cut-off clutch must be provided.

The GM converter can be used for push starting of the engine. It will crank the 71 series Diesel engine at 600-800 rpm of the output shaft, the speed depending upon temperature and amount of oil in the unit.

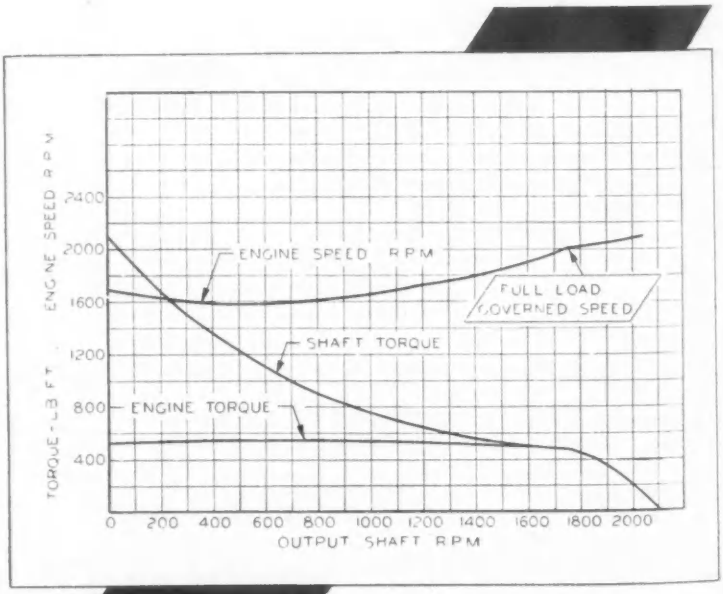
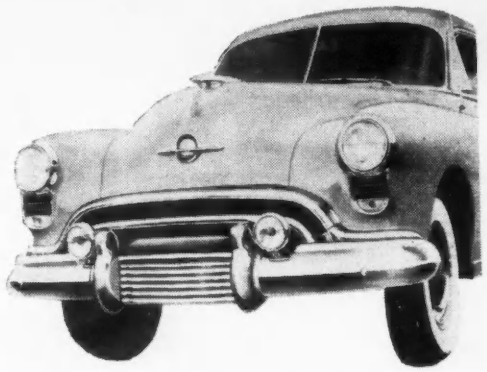
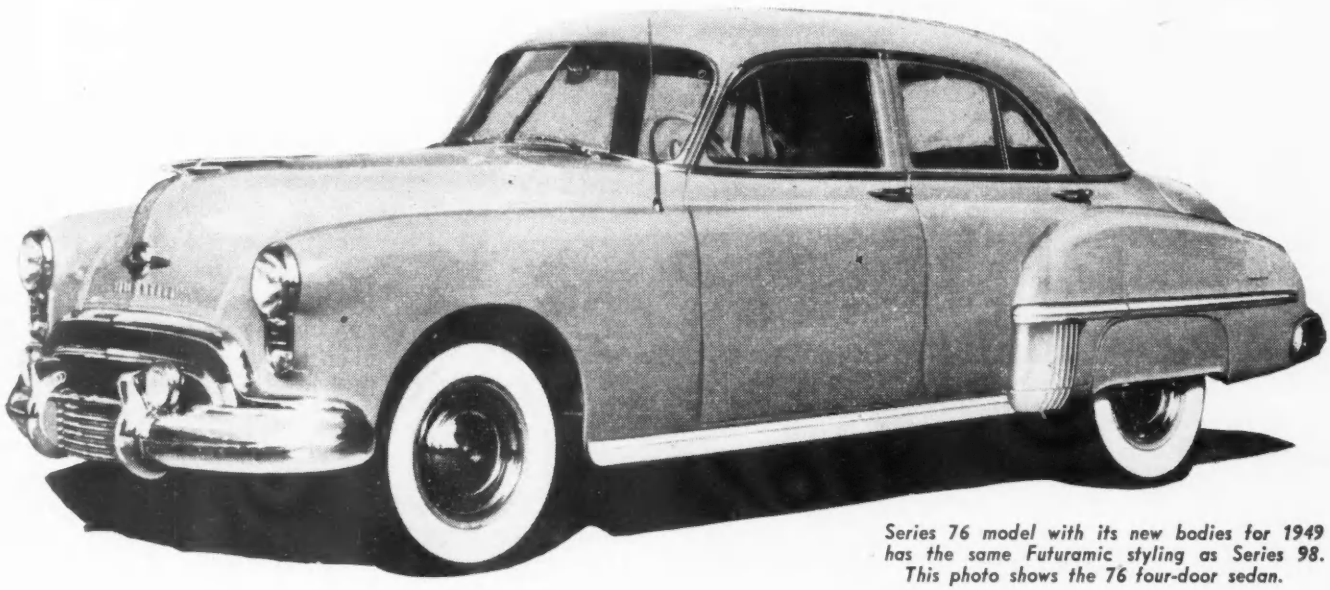


Fig. 5—Torque Characteristics of General Motors Converter Power Unit (6 cylinder 71 Series Engine).

Futuramic Styling Extended to All 1949 Oldsmobiles



Frontal styling of the 1949 Oldsmobile models.



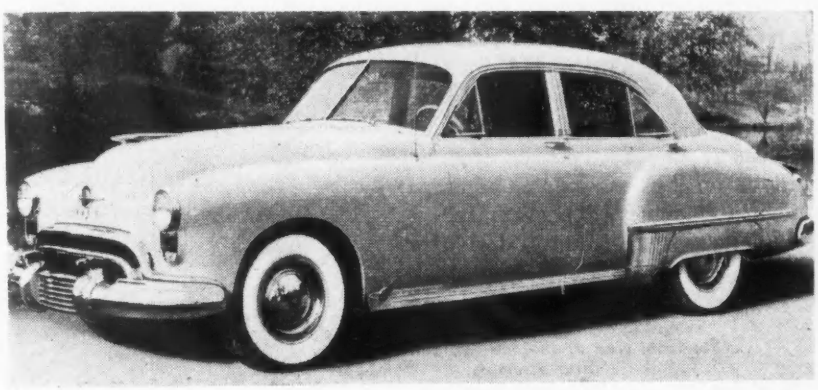
Series 76 model with its new bodies for 1949 has the same Futuramic styling as Series 98. This photo shows the 76 four-door sedan.

FOR 1949, all series of Oldsmobiles will have Futuramic styling. The new Futuramic Series 76 will introduce Fisher's newest body, along with newly-styled frontal and fender treatment. The Futuramic Series 98 will be newly-styled outside, and newly-appointed inside. Both Series will offer new engines—the 76 powered by an improved Big Six, and the 98 featuring the Oldsmobile 1949 Rocket high compression, V-type, eight-cylinder, overhead valve engine and its new Rochester carburetor, both of which are described in detail on the following pages.

The six cylinder in-line engine in the 1949 Series 76 Futuramic has a bore of 3 17/32 in. and a stroke of 4⅜ in. as compared to 3½ in. by 4⅛ in. for the 1948 six. The new engine develops 105 hp; five hp more than the previous six cylinder engine.

The Futuramic 76 Series will consist of six body types. In addition to the four-door sedan, club sedan, coupe and convertible models, there will be an entirely new streamlined four-door town sedan, and a new deluxe six-passenger station wagon with steel top. The Futuramic Series 98 model will include three body types—four-door sedan, club sedan and convertible coupe. Thirteen solid colors and four two-tone combi-

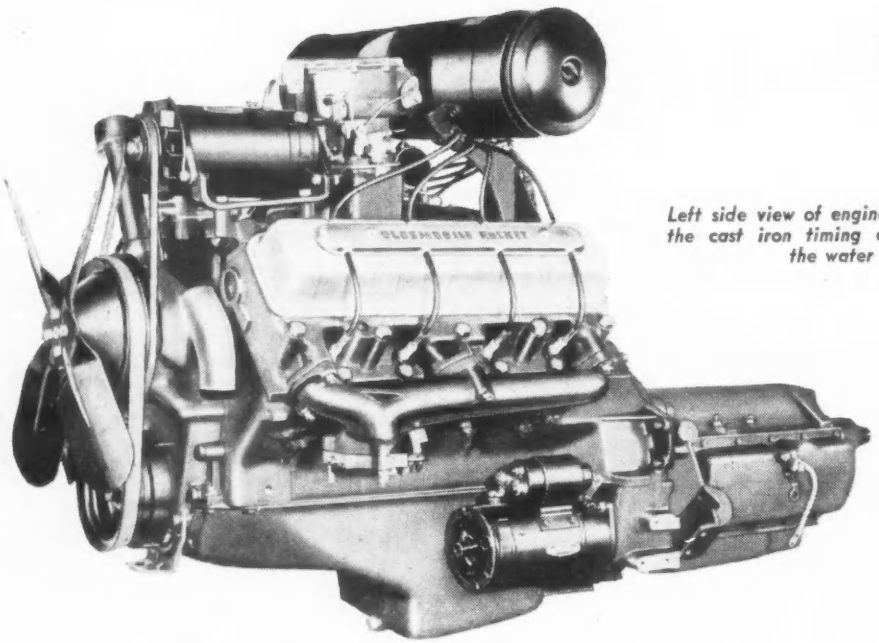
(*Turn to page* 82, *please*)



Four-door sedan of the Series 98 Futuramic model. It is powered by the new Rocket 135 hp overhead valve engine.

Oldsmobile's High

By Joseph Geschelin

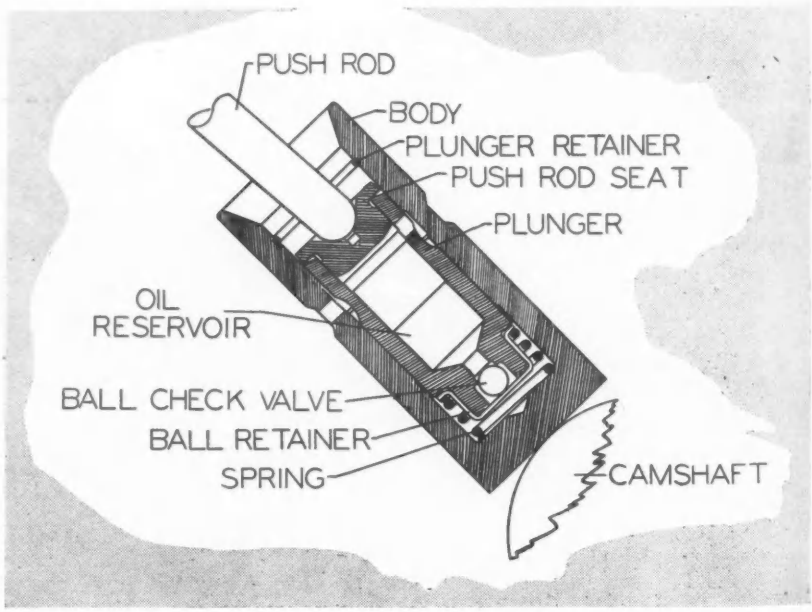


Left side view of engine and transmission. Note the cast iron timing chain cover which forms the water pump body.

FOLLOWING preliminary publication of some of the major features of the new Oldsmobile valve-in-head, V-type, eight-cylinder engine (see AUTOMOTIVE INDUSTRIES, Oct. 1, 1948, page 19), the Oldsmobile Division of General Motors Corp. has made available more complete details and illustrations of its advanced type of high economy, high compression engine. Although the version introduced for use in 1949 Oldsmobiles has a compression ratio of 7.25 to 1, the basic engine design is capable of progressive increases in compression ratio to a limit of 12.5 to 1 without modifications in major detail.

With a displacement of 303 cu in. the engine develops a maximum of 135 hp at 3600 rpm which Oldsmobile considers ample for providing exceptional performance in the 98 Series cars in combination with the improved HydraMatic transmission. Consequently, it is the present plan that as the compression ratio may be increased in the future, emphasis will be on still further increases in thermal efficiency, hence greater fuel economy, rather than in the direction of increased car performance. In any event the present compression ratio is based upon the available premium fuels and any increase later on will depend upon the availability of fuels of higher octane rating.

In basic design, the engine features valve-in-head construction with a simplified system of valve actuation laid out in conjunction with newly-designed hydraulic valve lifters. The compactness of this arrangement coupled with unique, slipper-type pistons, a relatively short stroke and short connecting rods, makes for a low engine. This, in turn, has had a marked influence upon weight reduction of the entire assembly. The engine has a weight of 745 lb (dry), with a weight per hp of 5.52



Sectional view of the new hydraulic valve lifter assembly.

Compression Engine

New Eight-Cylinder, 303 Cu. In., V-Type Power Plant, Developing 135 Hp with 7.25 to 1 Compression Ratio, Features Overhead Valves and Hydraulic Valve Lifters. Design Permits Increasing C.R. to 12.5 to 1 Without Major Modifications.

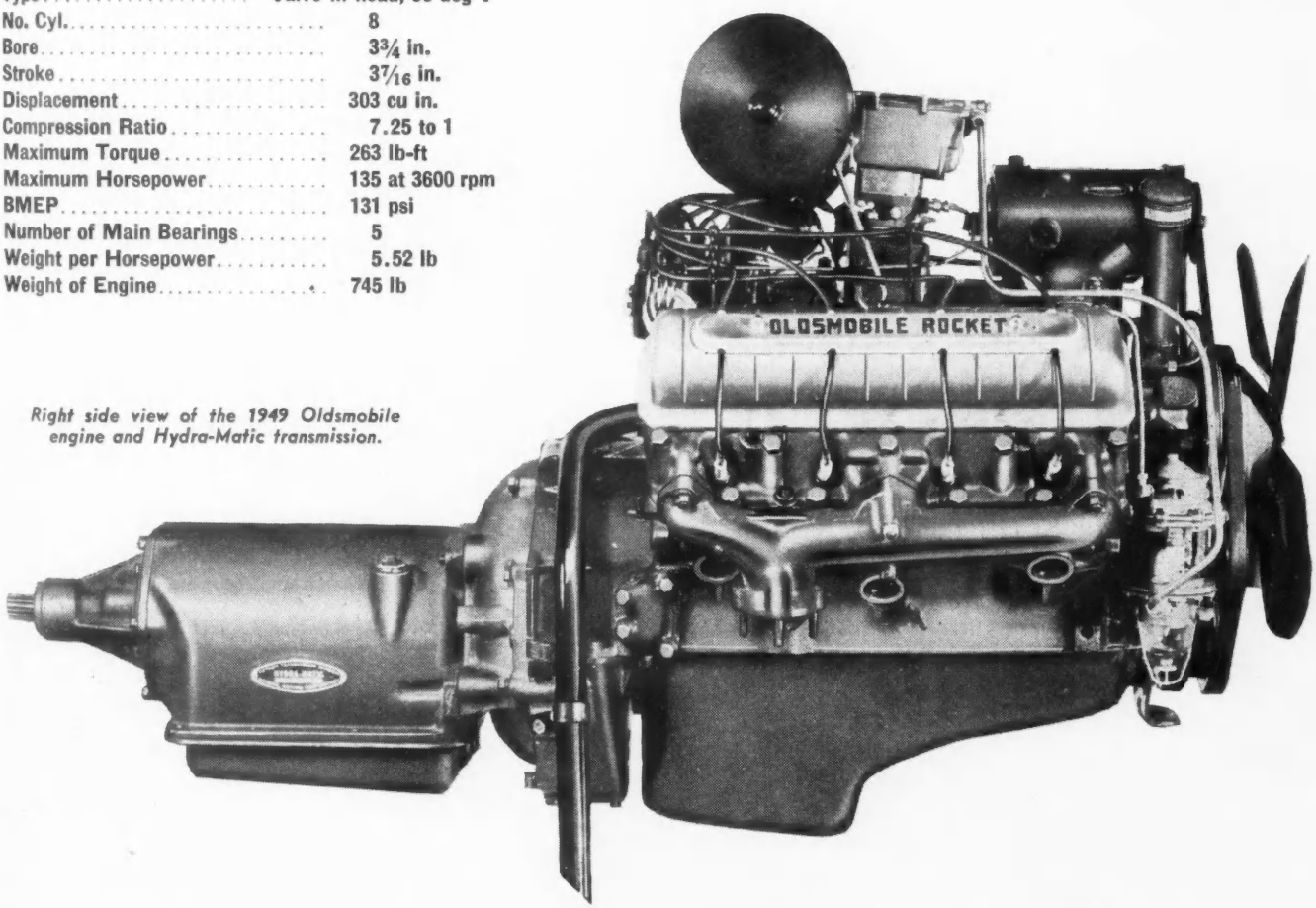
1949 Oldsmobile 8-90 Engine Condensed Specifications

Type	Valve-in-head, 90 deg V
No. Cyl.	8
Bore	3¾ in.
Stroke	3 7/16 in.
Displacement	303 cu in.
Compression Ratio	7.25 to 1
Maximum Torque	263 lb-ft
Maximum Horsepower	135 at 3600 rpm
BMEP	131 psi
Number of Main Bearings	5
Weight per Horsepower	5.52 lb
Weight of Engine	745 lb

lb. It is 34-11/32 in. in height, 27-15/16 in. wide, and only 33-1/16 in. in length from rear of flywheel housing to front of fan.

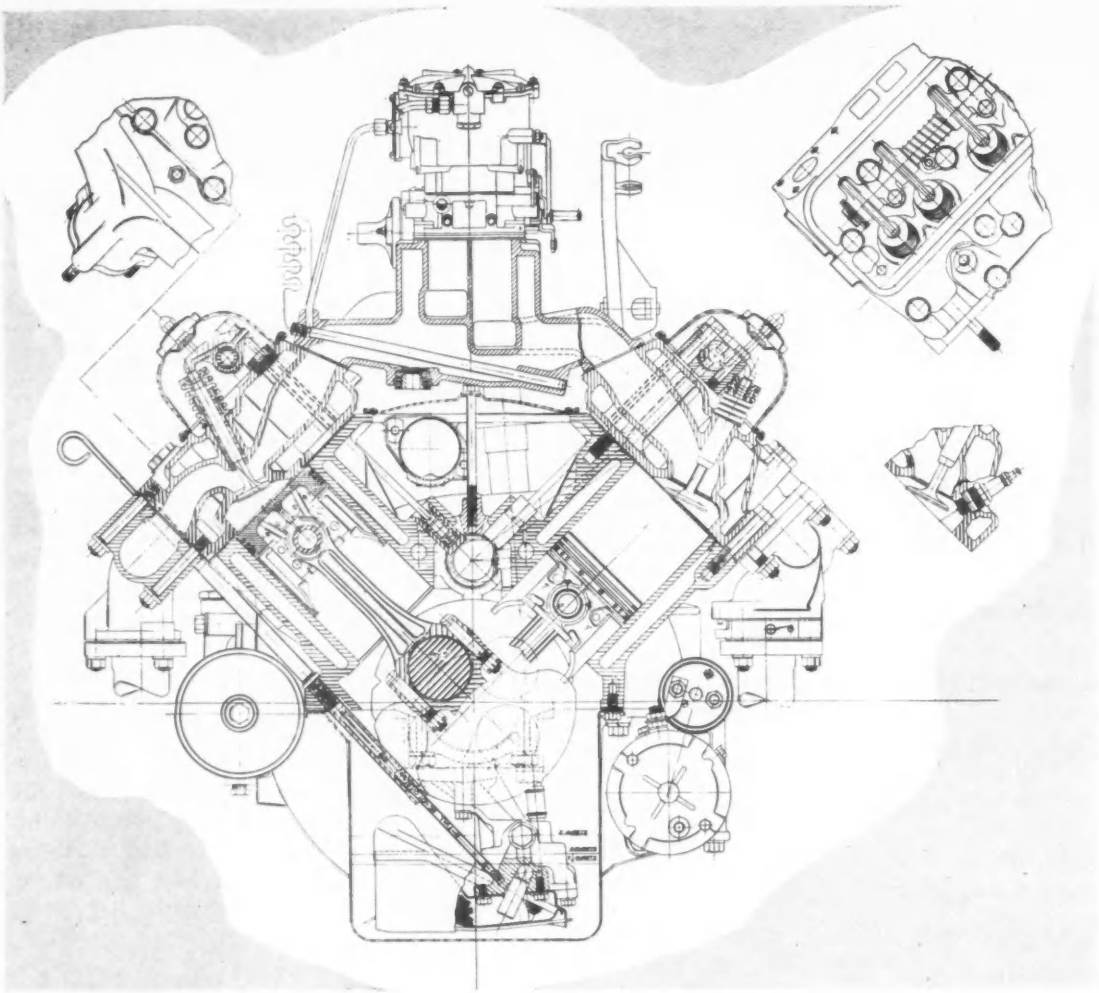
The combustion chamber is accurately cast to size and shape, and requires no further machining, volume being gaged to fine limits by checking with a new type of ultra-sonic gaging device. It affords ample room for valves of generous size, the intake valve head being 1¾ in. in diameter while the exhaust valve head is 1-7/16 in. in diameter. The spark plug, positioned for most effective firing, is of 14 mm size. Some impression of the overall efficiency of the engine may be gained from the fact thermal efficiency is rated at 26 per cent, while mechanical efficiency has been upped to a high of 91 per cent. Specific fuel consumption is 0.533 lb hp hr and fuel ecenomy is said to exceed the highest values possible with the former in-line eight.

Coming to the lower structure, we find that the essential rigidity of both the crankshaft and crankcase have been developed to an exceptional degree by

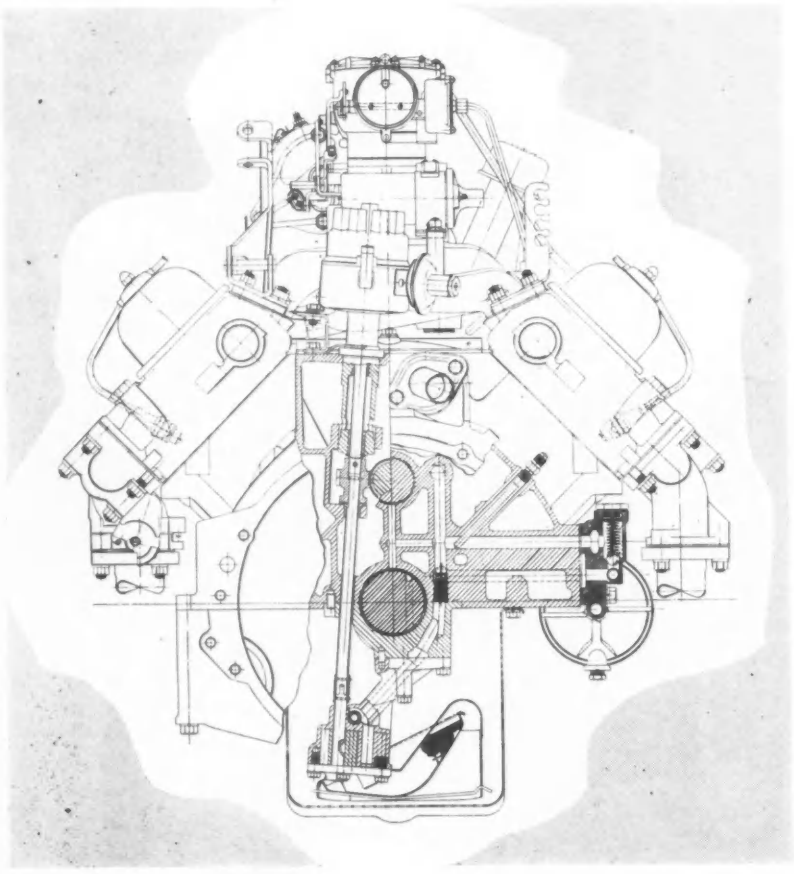


Right side view of the 1949 Oldsmobile engine and Hydra-Matic transmission.

New Olds Engine



Transverse section of the Oldsmobile V-type Eight engine showing details of cylinder assembly, combustion chamber, and valve actuating mechanism.



Transverse sectional view of rear end of the engine showing details of oil pump and distributor drive as well as oil passages to and from the filter.

the use of five main bearings. These are of Durex 100A type—2½ in. in diameter for No. one, two, three and four and 2⅝ in. diameter for number five which takes the thrust. Connecting rod bearings too are of Durex type and are 2¼ in. in diameter.

The counterweighted crankshaft is 26⅛ in. long and is extremely rigid torsionally. By developing heavy ribbed main bearing bulkheads the crankcase is made very strong and rigid and yet constructed economically so far as size and weight are concerned.

The piston is of aluminum alloy with slipper type skirt and has integral steel struts. Through unique design it is rigid and holds its shape under all conditions and is said to give exceptional service life. Clearance with the cylinder wall is held to the minimum of

0.0005 to 0.0001 in. The piston is tin-coated and has three rings—two, 5/64 in. compression rings and one, 3/16 in. oil ring.

The induction system is of advanced type conducive to free breathing and uniform mixture distribution. The intake manifold is cast integrally with branches from the exhaust manifold for heating the mixture, and includes the water manifolding to the heads. The down-draft, dual throat carburetor is of a new design produced by one of the GM divisions, and has the unique feature that all of its major parts are mounted to the cover. Thus the removal of six fastening screws makes it possible to remove the entire operating mechanism for inspection or adjustment.

Another interesting feature, contributing to compactness, is that the timing gear cover is made of cast iron and incorporates as an integral part of the water pump body.

Separate exhaust manifolds are employed with a cross-over from the left bank to the right hand side forward of the engine.

As illustrated, the accessories drive at the front has two separate wedge type belts—one for driving the fan, the other for driving the

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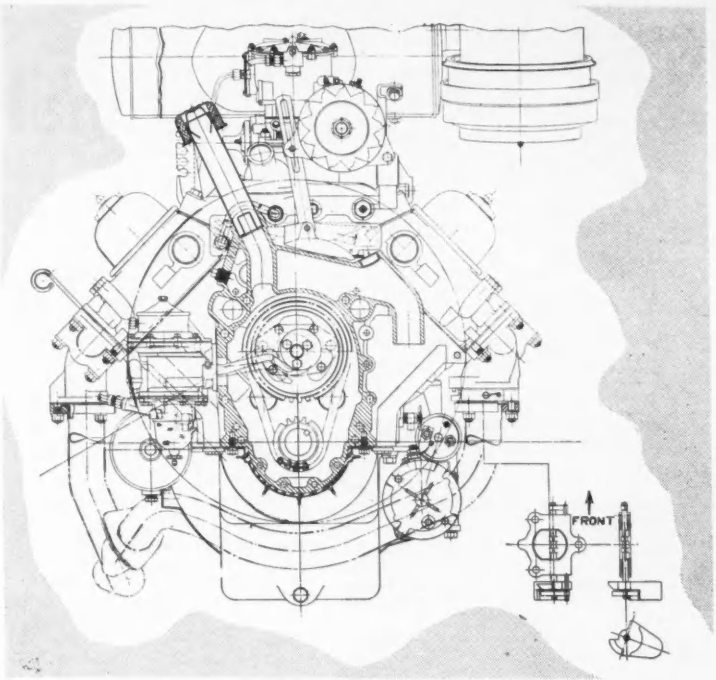
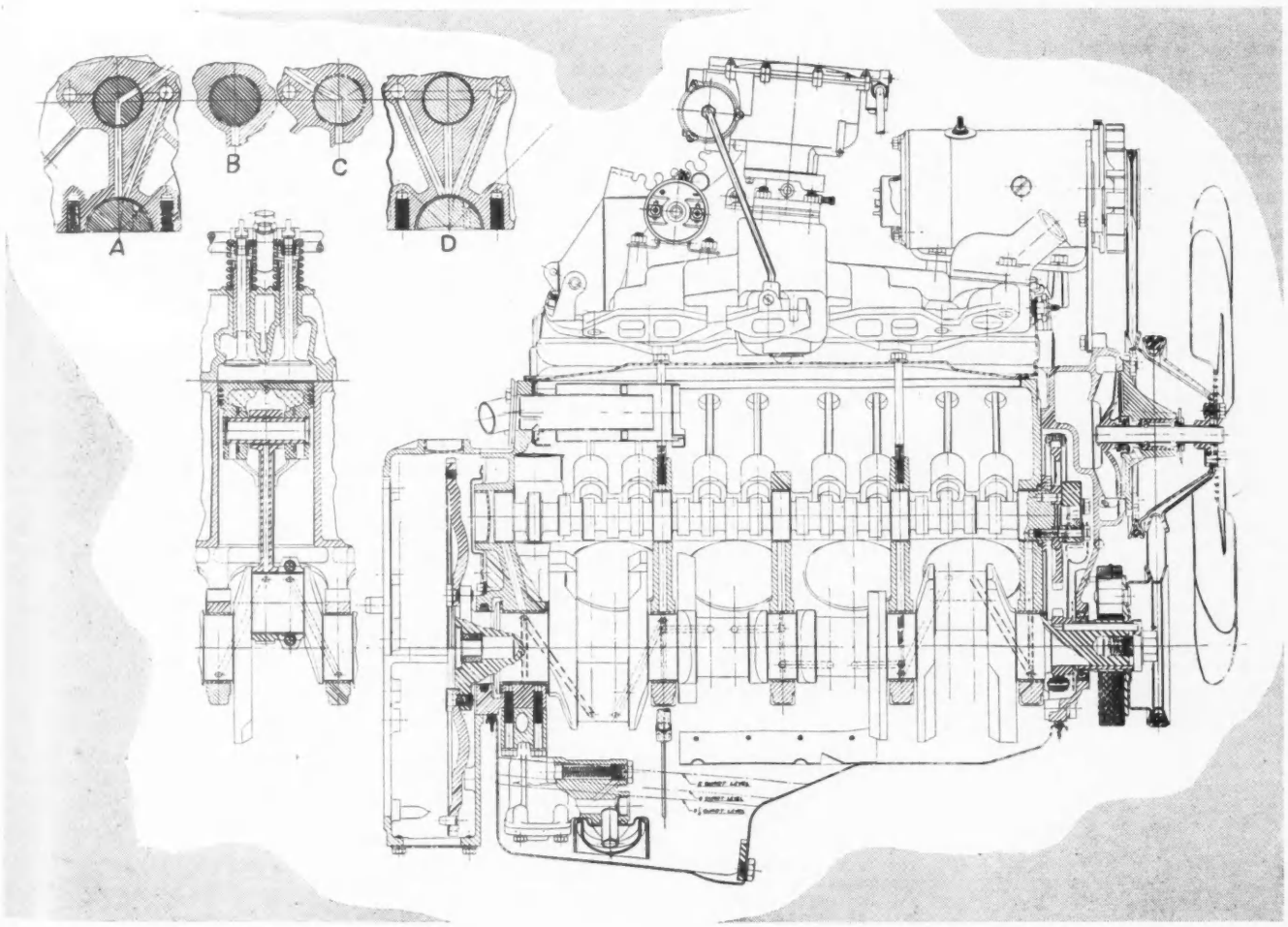
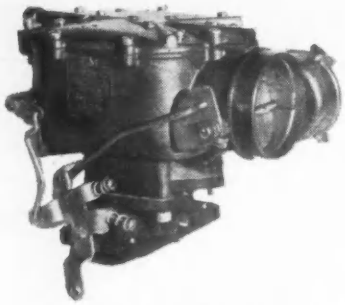


(Above) Transverse cross section at front end through the timing chain cover.

(Below) Longitudinal section of the new Oldsmobile engine showing details of crankshaft line and accessory drive.

A—Section through No. 4 Bulk Head
B—No. 3 Cam Bearing
C—No. 2 Cam Bearing
D—Section through No. 1 Bulk Head





External view of the Rochester GM carburetor.

Original Design Features of Rochester Carburetor on '49 Oldsmobile Engine

THE NEW carburetor developed by the Rochester Products Division of General Motors and now being used on the 1949 Oldsmobile engine is of entirely original design and incorporates a number of interesting features. Two of its more unique features are the horizontal air inlet and the compactness of the entire assembly, which is a scant five in. in height. The air cleaner is mounted on a level with the carburetor, thereby permitting lower hood design by the car manufacturer. Another feature is the comparatively low float bowl temperature during all driving conditions. This bowl is suspended from the cover within the outer housing of the carburetor so that it is cooled by incoming air. Heat from the manifold must travel up through the outer housing, through insulating gaskets and then down to the gasoline in the bowl

The cover and bowl assembly may be removed from the outer housing for cleaning or inspection by removing eight screws and disconnecting the fuel line. It contains all the calibrated parts of the carburetor. This unit may also be purchased as a service assembly, thereby eliminating the need for a complete replacement carburetor.

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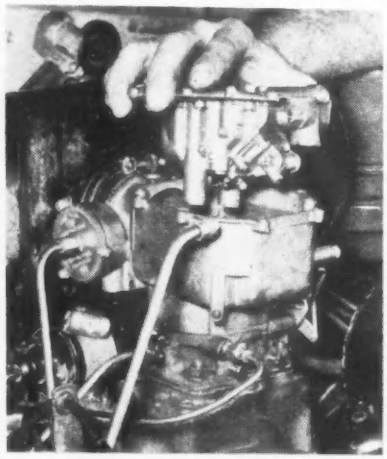
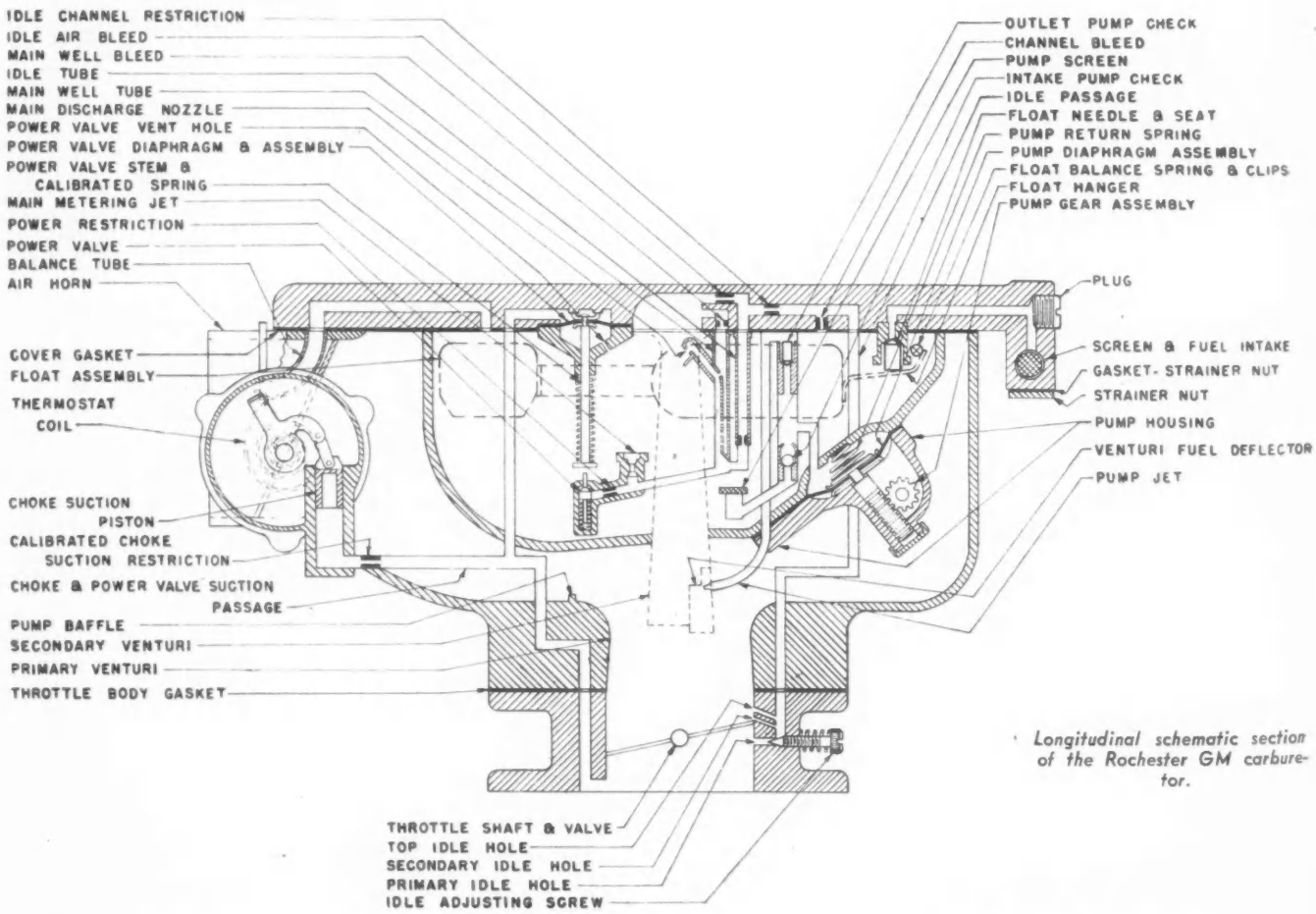


This photo shows how the cover and bowl assembly is removed from the outer housing of the Rochester carburetor.



Longitudinal schematic section of the Rochester GM carburetor.

Japanese Automobile Industry Reorganized on Limited Basis

THE automobile manufacturing industry in Japan today is in a fairly depressed state due to shortages of materials. For current operations the plan is that approximately 24,000 trucks, including both standard trucks and small four-wheeled trucks, are to be produced per year by five companies—Toyoda Automobile Industry, the Diesel Automobile Industry, the Mitsubishi Heavy Industry, the High Speed Engine Industry, and the Nissan Heavy Industry. Of this figure 19,400 are standard trucks and 5400 are small four-wheeled trucks.

The makers of standard trucks are Nissan Heavy Industry which builds the Nissan, Toyoda Automobile Industry which makes the Isuzu truck, and Mitsubishi Heavy Industry which makes the Fruso. The Diesel Heavy Industry produces Diesel engines for these trucks. Small four-wheeled trucks consist of the Datsun of Nissan Heavy Industry, Toyoppet of Toyoda Automobile Industry, and Ohta of High Speed Engine Industry. Besides these vehicles it is expected that approximately 20,000 small-type three-wheeled trucks, two-wheeled vehicles, scooters, electric automobiles, etc., will be produced. No passenger cars are to be produced.

The above figures are for the 1948 manufacturing plan as determined from the allotment of steel. In making comparison with previous years — 9800 trucks were built in 1947; 14,800 trucks in 1946; and the production schedule calls for 19,400 trucks (standard type) for this year.

The three main automobile factories in Japan today are Nissan, Toyoda and Diesel. The highest in their production records was shown in 1944 when each company produced an average of approximately 1000 cars per month.

Cost of Automobiles

As Japan is hit with inflation the present day valuations cannot be determined in terms of dollars, but the manufacturers' prices of principal trucks produced today are as follows in yen:

Nissan truck chassis	199,522
Toyoda truck chassis	199,522
Mitsubishi Fruso bus chassis	460,480
Diesel truck chassis	238,318
Datsun truck	109,392
Toyoppet truck	168,000
Truck body	20,500
Bus body	105,500

Selling System of Automobiles

Like America, Japan now has a dealer system for selling automobiles. During the war the control company, the Japan Automobile Distribution Co., Ltd., handled all the cars and trucks produced and sold within the country.

At the time this company was dissolved after the termination of the war the said dealer system was adopted. The dealer as a specialized salesman of Nissan, Toyoda, Diesel or others, depending on what make of car he sells, manages his business inde-

(*Turn to page* 82, *please*)

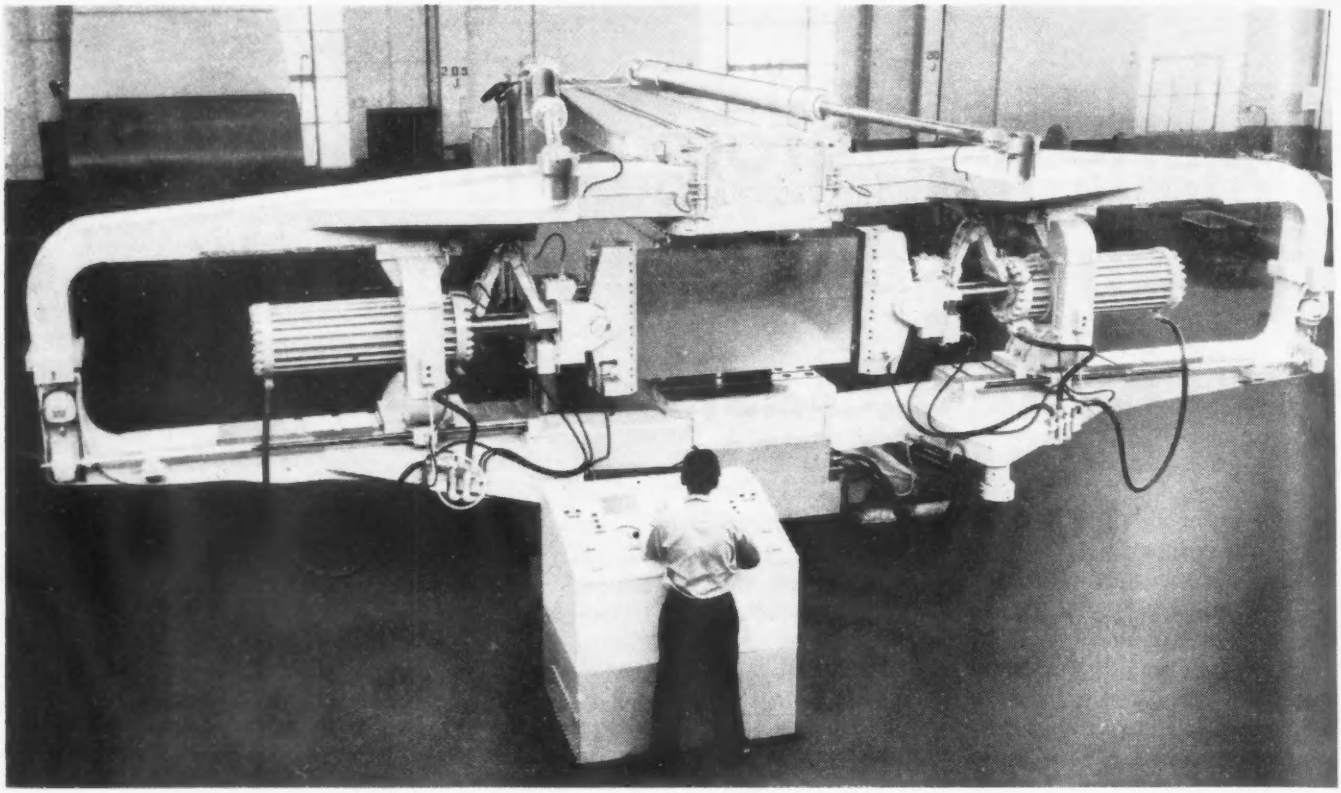
Automobiles in Japan — June, 1947

Vehicle	Number
Cars	21,925
Buses	11,491
Small 4-wheelers	24,083
Trucks	94,754
Other	10,663
Total	162,916

Truck Production in Japan

(First six months of 1948)

Make	Number
Toyoda	2,374
Nissan	2,515
Isuzu	1,204
Fruso	383
Toyoppet	175
Datsun	1,090
Ohta	296
Total	8,037



Greater Capacity Presses Possibilities for Stretch

By J. J. Sloan

Production Design Engineer,
North American Aviation, Inc.

DUE to increased capacity of sheet metal stretch presses the group of materials capable of being stretched over contoured dies has been expanded to include all of the soft aluminum alloys, 24S-T, 75S-O and corrosion resistant steel annealed and ½ hard. Thicknesses up to 0.064 in. are regularly done in all the materials mentioned.

Several production parts are stretched from 0.125 in. 24S-O and in one case 0.250 in. gage 24S-O is wrapped to contour, heat treated and restretched. Due to the relatively low elongation and high springback of 75S-T, stretch forming of 75S material is done in the "as quench" condition. Drawings however should specify 75S-O.

The maximum size of any part stretched to shape is limited to the available sheet size in most cases, however machine limitations in relation to jaw dimension and sheet thickness vary with the machine as follows:

VARIATION OF STRETCH PRESS DIMENSIONS AND SHEET SIZES

Machine	A	B	C
Maximum stock width	48 in.	96 in.	54 in.
Maximum thickness 24S-T	0.051 in.	0.102 in.	0.250 in.
Capacity based on typical yield strength of 24S-T (48,000 psi)	117,000 lb	430,000 lb	650,000 lb
Maximum die length parallel to stretch	120 in.	72 in.	94 in.
Maximum die width transverse to stretch	48 in.	98 in.	58 in.

The maximum thicknesses indicated in the preceding table are for the given stock width, but any greater thickness may be pulled on a machine if its corresponding cross-sectional area remains the same, i. e., on machine "A" a 0.102 in. thick sheet may be stretched if its width is only 24 in. These values are necessarily approximate, since the shape of the parts affects the stretching power available to some extent. When designing a new part to be stretch formed, available sheet size and neceseary edge allowances should be considered as a limit on maximum size. A one in. trim line must be allowed on all sides plus a three to eight in. clearance between the edge of the die and the edge of the sheet in direction of stretch. This may be much greater for longitudinal stretching of saddleback shapes (Fig. 4).

The most desirable shape for stretching is a convex contour. Therefore, in designing parts to be formed on the stretch press, certain features should be avoided. The reverse curve cannot be attained if the curve is in the direction of stretch, only if at right angles to it (Fig. 3).

In transverse stretching (Fig. 4) of the saddleback shape the edges of the sheet metal contact the die first.

Fig. 1—Fifty-ton Hufford sheet metal stretch press. The basic stretch forming process consists of gripping a sheet of material, or a rolled or extruded section, at each end in suitable jaws and stretching and wrapping over a die made to the required contour.

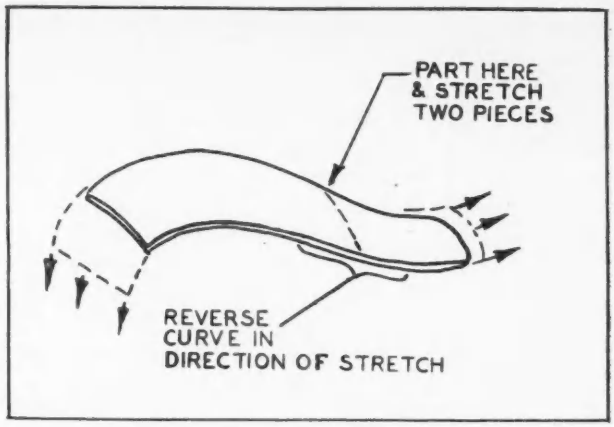


Fig. 3—Shapes having reverse curves parallel to the direction of stretch should be parted at the line of tangency and formed in two pieces.

Provided such parts are less than 42 in. in width, they may be stretched and wrapped to shape on the latest Hufford Model 50 stretch press. Parts wider than this, which must be placed on other presses, are subject to wrinkling as the edges of the sheet slide downhill. Such wrinkles are necessarily removed by power hammering or hand finishing.

The most desirable shape for stretching is a convex contour, but its reverse, the saddleback, is very difficult except where the general contour is relatively flat or where it is adaptable to the longitudinal stretching. Fig. 4A shows a saddleback shape in a Hufford sheet metal stretch press in longitudinal stretching. Note that its curvature is slight in the direction of stretch and that considerable length of material is required between the die and the stretch jaw to allow a gradual transition from the curved die to the flat jaw.

As in other types of sheet metal forming, sharp bends should be avoided as much as possible. In stretching sheet metal into a V trough, the radius at the bottom of the trough should be at least eight to ten times the metal thickness. Although the tendency for the metal to slide downhill is great, friction and the strength of the material prevent forming a normal minimum bend radius. Such a part is a bomber fuselage longeron shown in Fig. 5.

Fig. 6 and 7 show typical shapes and the alternate directions of stretch forming. Tentatively the limit for longitudinal stretching is a minimum length of twice the width of the part. This becomes a design consideration only where severely formed parts should be stretched parallel to the grain of the metal in order to take advantage of maximum permissible elongation of the material, or for a saddleback shape as previously described.

No accurate estimate of the percentage of elongation occurring during stretch forming can be made from its design since other factors affecting this are: the stress applied beyond tensile yield strength and local friction between part and die. The

Increase Forming

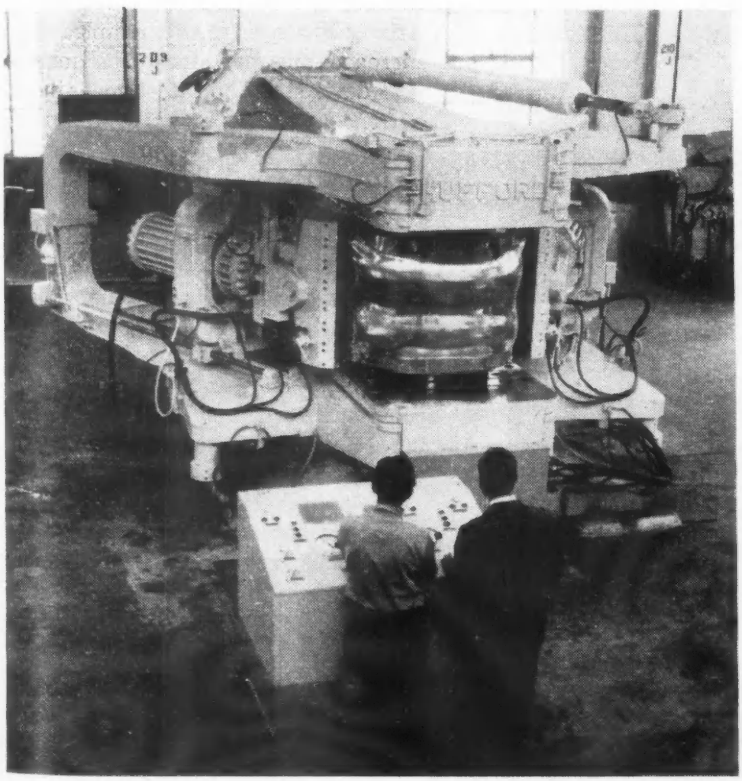


Fig. 2—After prestretching the sheet, the arms, actuated by hydraulic cylinders over and under each arm, fold back along the machine to form the part over the die.

actual elongation may run as high as five per cent in excess of any estimate made from the design. A rough design estimate may be made by calculating the average length of the edges of the sheet metal part compared to the distance "over the crown" measured parallel to the direction of stretch (Fig. 7). Typical shapes marked and measured before and after stretching show that the maximum elongations seldom exceed 14 per cent for 24S aluminum alloy.

Similarly no accurate estimate of the reduction in thickness can be arrived at. Sample parts measured have proved that such reduction may run as high as seven per cent with the average about five per cent.

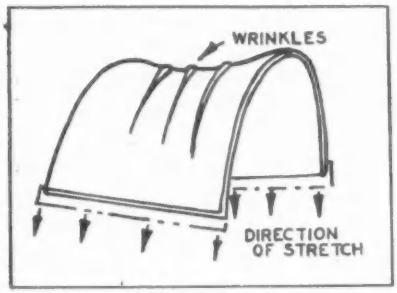


Fig. 4 — Transverse stretching of saddle back shape.

All form dies are made to the exact contour of the shape desired and no correction is made for springback. This is due to the progressive method of forming, wherein the stretch begins at the point of first contact with the die and proceeds area by area away from this point toward the edges of the sheet.

The net effect of stretching, as in any forming method, is to work harden the material, increasing both tensile yield and ultimate strengths and decreasing the amount of elongation left. Typical values show increases up to 20 per cent for yield and up to 10 per cent for ultimate strength for material in its final temper and not subject to further heat-treatment. Although these values are not taken advantage of by design they represent an extra margin of safety.

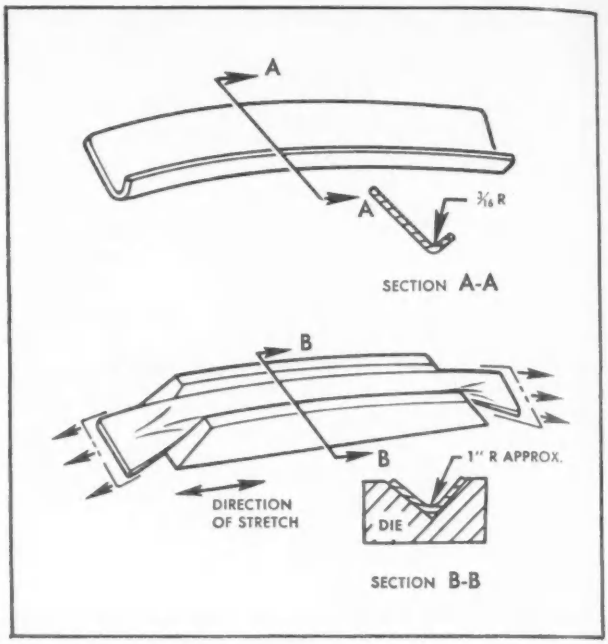


Fig. 5—Top—A bomber fuselage longeron made from 0.125 in. thick 24 S-0 with approximate dimensions 12 in. by 108 in.

Bottom — In stretching this part the material is clamped in a Sheridan stretch press and pulled longitudinally over the die as shown. Although 0.19 in. radius is the drawing specification the minimum formed is about one in. A second form operation is required to set the radius. A lead punch was poured to mate the die and the parts restruck on a hydraulic press.

As in sheet metal stretching considerable advance in technique of forming has been made, coupled with increased power, since this method was devised. The latest machine to become available is a 100 ton Hufford section stretch press necessitated by the greatly increased area of extruded sections used for bomber wing joints and extended use of ½ hard stainless steel formed sections for fuselage frames, etc. (Fig. 8.)

Many jobs are now accomplished by stretch forming which has become an accepted practice. This new practice has certain advantages:

1. Springback is reduced.
2. Sections can be formed in one piece that required two or more

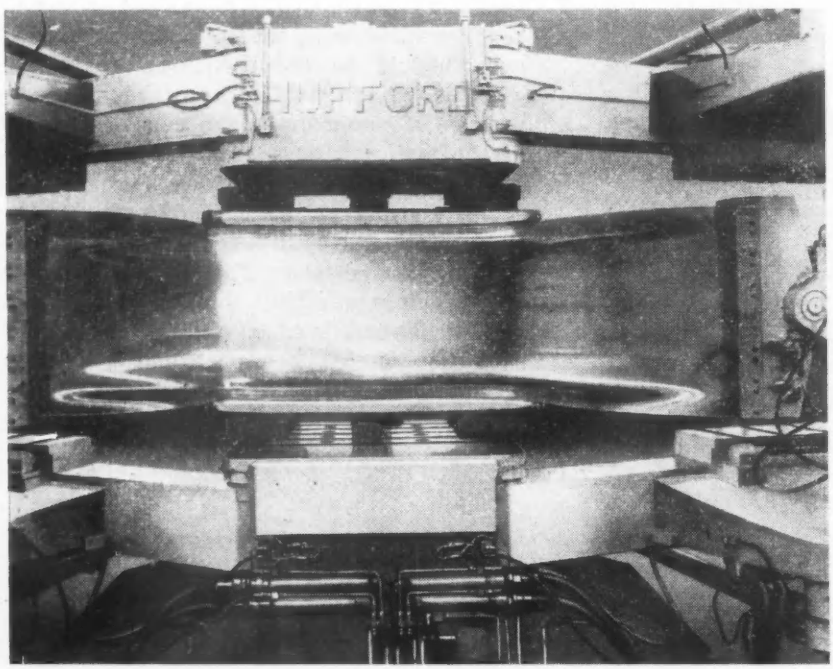
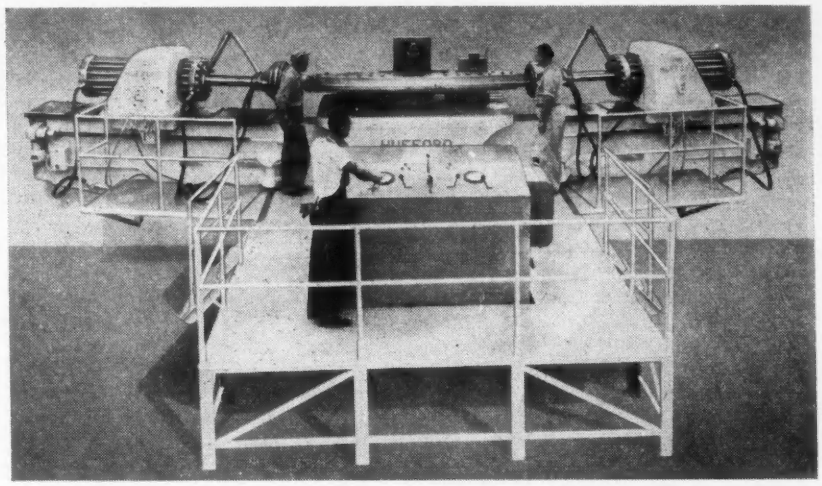


Fig. 4A—Saddleback shape formed longitudinally by Hufford sheet metal stretch press.

Fig. 8—One hundred ton Hufford section stretch press.



separate parts by the old methods.

3. Almost any cross-sectional shape can be formed.

4. Uniformity of parts is more consistent than by previous methods.

5. The angles between legs of a given section may be varied on the stretch die. Such "degreeing" was formerly necessarily done by hand.

6. Tensile and yield strength are increased and elongation decreased.

A disadvantage is that curvature is mostly limited to a single plane.

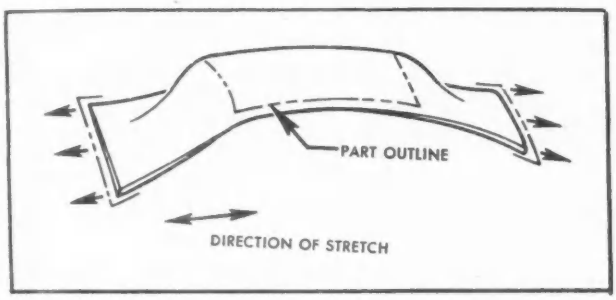


Fig. 6—Longitudinal stretching.

Also the forming of joggles or sharp reverse curves is usually done in other operations unless the material is relatively soft enough in temper to permit forming these elements by mallet and fiber block while the part is still under tension on the die.

Contours with included angle greater than 180 deg are now practical. Recent development of equipment as shown in Fig. 9 and 10, now makes possible complete circle forming of certain shapes. The die is fastened to a drum on which is wound a steel cable. One end of the work piece is clamped to the die and an initial stretch applied. The pressure is maintained as the drum and die revolve and the part wrapped around the die through 360 deg of rotation.

This method of forming has an advantage, in that it eliminates one of the splices necessary for two separate pieces, thereby increasing strength of the structure and decreasing weight. Up to one third of the cost of manufacturing may be saved through decreasing the number of pieces involved and assembly time for splicing.

Any of the commonly used sheet metal and extruded aircraft alloys may be stretch formed. Their temper is the determining factor in the amount of contour which it is possible to form. The most desirable temper for the non-heat-treatable alloys is the annealed condition and the ¼, ½, ¾ and full hard tempers are formed with increasing difficulty as hardness increases. In addition, corrosion resistant steel, except annealed, is inconsistent in temper and spring-

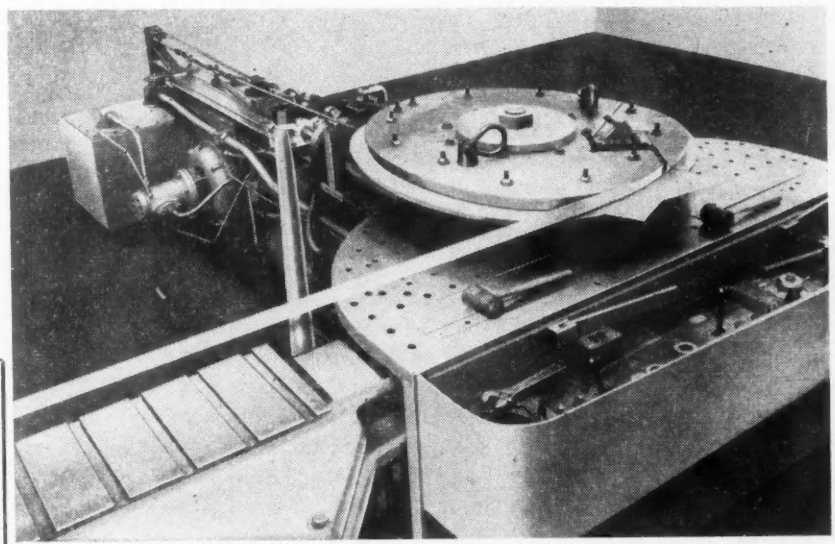


Fig. 9—Fuselage frame prepared for forming.

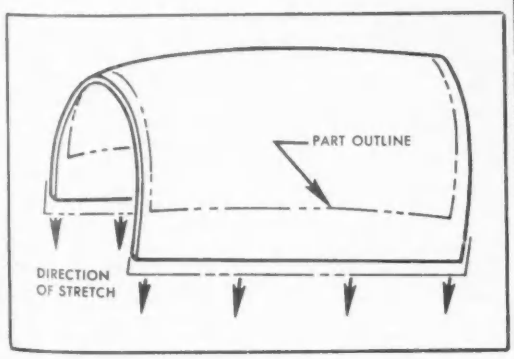


Fig. 7—Transverse stretching.

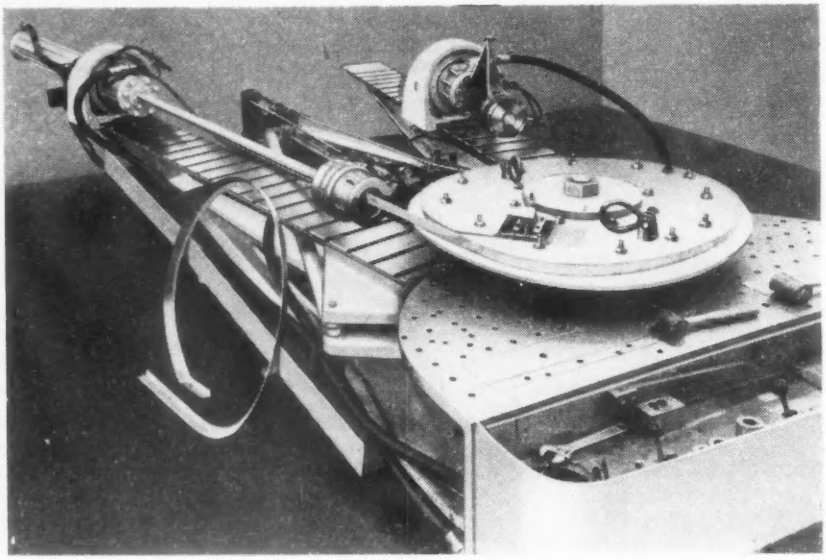
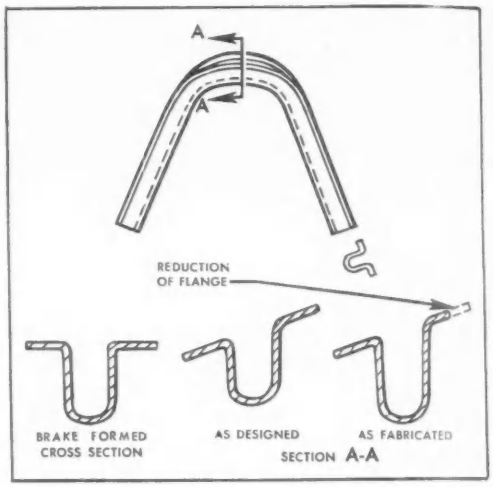


Fig. 10—Complete circle fuselage frame after forming.

Fig. 12—This section was brake-formed as shown at the left and then stretched. Its designed shape and also how this shape was compromised in forming by an actual movement of the bend radius are shown at section A-A.



back, with spots of relatively low and high yield strengths, within the same sheet of material. These add to the difficulties in developing a die for springback.

Most stretch forming of the heat-treatable aluminum alloys is done in the "as quench" condition. Shapes of relatively large cross-sectional area or those which are required to form to sharp curvature are stretched in the annealed condition followed by heat treat and restretch. All wing and fuselage joint

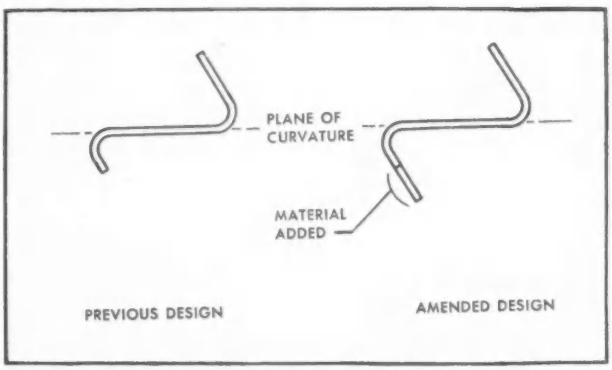


Fig. 11—Material equalized about plane of curvature to prevent "corkscrew".

angles are stretched annealed or as quenched. As purchased from the mill 75S-W has been found to be too inconsistent in temper for this process. Aside from the above cases no specific rule for indicating temper on the drawings can be made. In general, annealed material should be specified except where the contour is slight with cross-sectional area less than 0.5 sq in.

The optimum desirable shape for section contour forming is a hat section, either extruded or formed, because of its stability after forming. When released from the die the hat will twist least of any due to unbalanced springback. Other sections such as the L or Z will "corkscrew" to some extent dependent on the temper of material. On at least one occasion it has been necessary to add material to one leg of a Z to prevent this in a part made from ½ hard stainless steel (Fig. 11.)

During section contour forming the angle between the legs of the section may be changed by the stretch die, either opening or closing the angles, provided this does not result in an overall twist of the section. Extreme cases of such twist cause actual displacement of the bend radii in sheet metal formed hat sections. An example is a hat section made from 24S-0 (Fig. 12.)

(*Turn to page 58, please*)

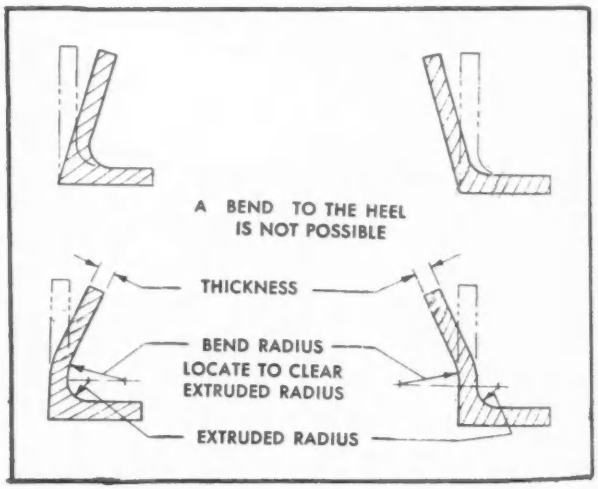


Fig. 13—Extrusion while on the stretch die cannot be "bent to the heel."

Houdaille-Hershey's Central Research Laboratory

By Walter Pinner
Director of Research
Houdaille-Hershey Corp.

THE Houdaille-Hershey Corporation has recently placed in operation its own central research laboratory in Detroit, designed to augment research activities currently carried out in its individual plants. The Corporation operates ten plants in the Middle West. Although the majority of these plants serve the automotive and refrigeration fields, diversification in the Corporation's products involve, among other activities, the manufacture of equipment for use in the maintenance and clarification of lubricating oils.

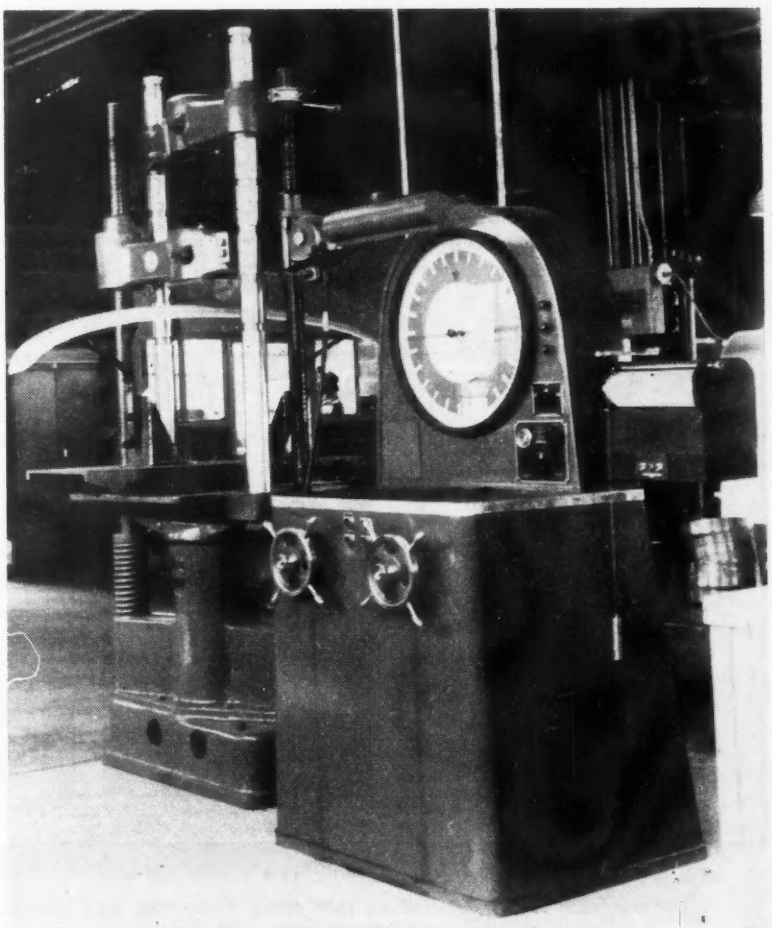
Beginning with the formation of the company in 1928, and continuing throughout its history, research and development have been carried out by engineers in its manufacturing plants, and such programs have been further enhanced through the employment of industrial research organizations such as the Battelle Memorial Institute, Armour Institute and other agencies. Through studies of the application of viscous liquids have come new products such as the recently developed Torsional Vibration Damper.

In the metal finishing field, specific emphasis has been placed on electroplating and electropolishing studies.

Among other contributions, there has been developed information relative to the important relationship existing between electrodeposited metal thickness and its resistance to corrosion. This information has been of invaluable assistance to the automotive industry as a basis for its present specifications, particularly on parts subject to outside exposure. Additional studies in this important field have involved considerations of materials and methods for metal cleaning processes, plate distribution studies, corrosion as influenced by base metal surface, studies of copper and nickel anode behavior and other subjects.

The Corporation, in setting up its own research facilities, has followed the sound policy of maintaining its activities at a location entirely removed from any of its manufacturing operations. A new building has been equipped for research, engineering and development along the lines of specific interest to the Corporation. An Electrochemical and Analytical

(*Turn to page* 78, *please*)



Showing a deflection test on a bumper in progress in the metallurgical section of the Houdaille-Hershey Central Research Laboratory.

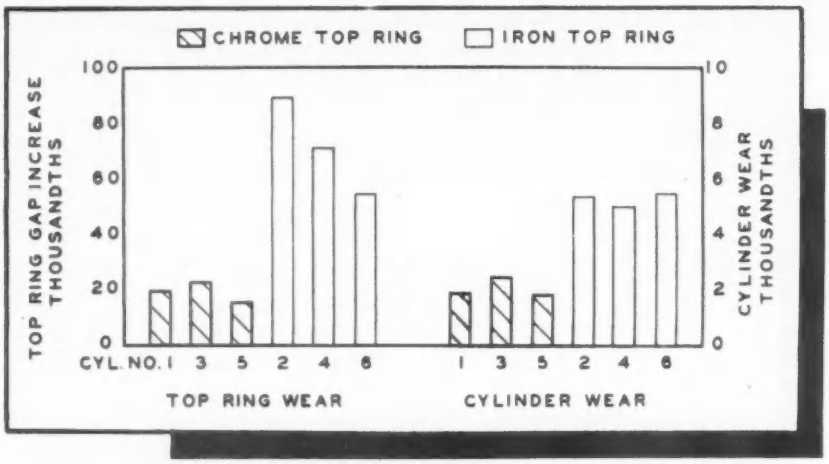


Fig. 1—Effect of hard chromium plated top compression ring on piston ring and cylinder wear when abrasive material enters the intake air.

Important

Piston Ring and Cylinder Wear in Diesel Engines

By John W. Pennington
Caterpillar Tractor Co.

WEAR of the piston rings and cylinders in an engine is one of the primary problems which has always faced engine builders and operators. The usual reasons for rebuilding an engine are high oil consumption and blowby. The usual remedy for the trouble is new piston rings and in engines which have cylinder liners, new liners. The cost of rebuilding cannot be considered just the cost of the actual parts and labor. With expensive equipment the time lost is frequently the most important item.

There has recently been considerable interest and work on both chromium plated compression rings and chromium plated cylinders. Fig. 1 shows the effect of a hard chromium plated top compression ring on piston ring and cylinder wear when abrasive material enters with the intake air. This test was run in a split six cylinder engine —three cylinders had chromium plated top compression rings while the other three had unplated cast iron top compression rings. In running this test, dust was fed at a constant rate to the engine oil-bath air cleaner. A very marked reduction in both top compression ring and cylinder wear is found when the chromium plated ring is used. Although no figures are shown, we have not found the chromium plated top ring to affect the wear rate of the lower rings.

Piston ring and cylinder material have a considerable effect on wear from corrosion. Fig. 2 shows the effect of a chromium plated top compression ring. Both cylinder and ring wear are greatly reduced.

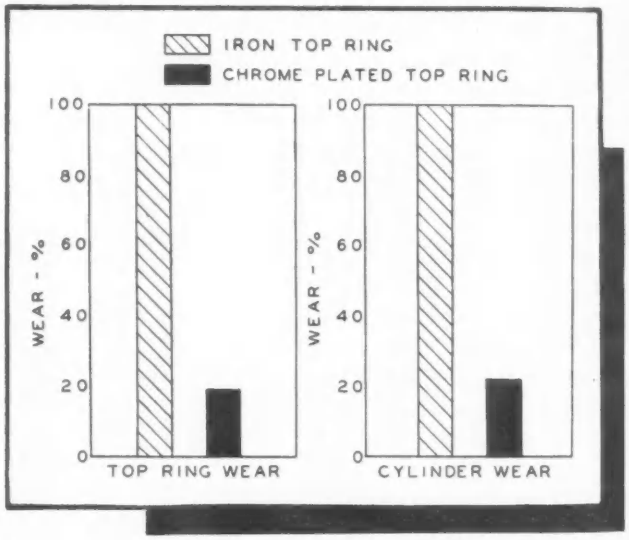


Fig. 2—Effect of chrome plated top ring on low temperature corrosive wear.

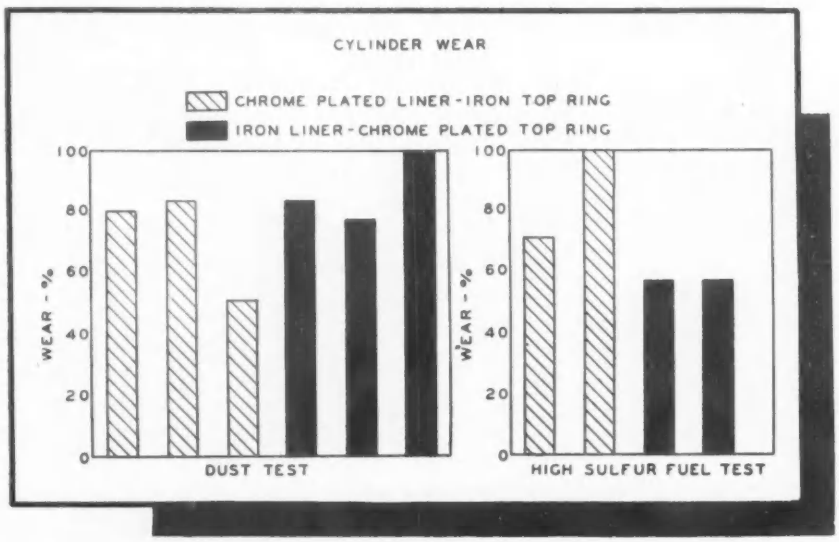


Fig. 3—Cylinder wear results obtained on split engine tests under both abrasive and corrosive conditions.

Fig. 3 shows cylinder wear results obtained on split engine tests under both abrasive and corrosive conditions. In half of the cylinders, chromium plated rings and iron cylinder liners were used; in the other half iron rings and chromium plated cylinder liners were used.

Fig. 4 shows the top piston ring wear obtained during the same tests. The cylinder wear was measured several times during the dust test. The piston ring wear was not measured until the end of the test. The cylinder wear figures are shown at a time before the end of the test. At the end of the test, some of the rings and cylinders had worn through the chromium so that the

Engineering Developments

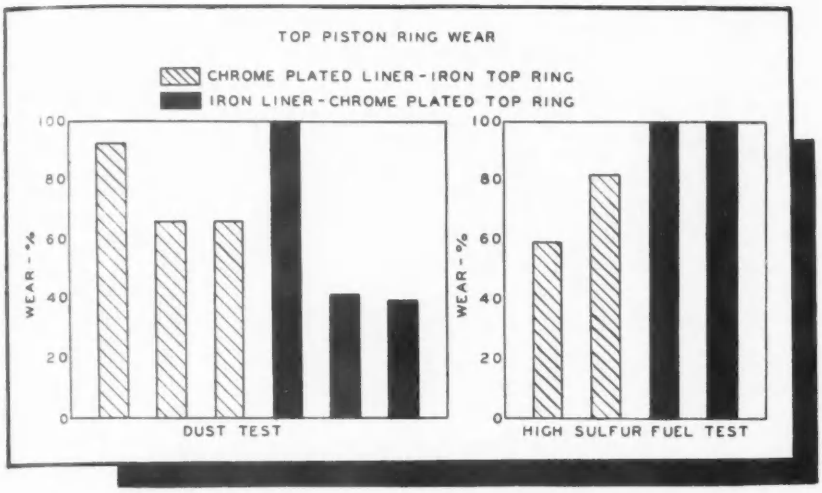


Fig. 4—Top piston ring wear during both abrasive and corrosive conditions.

wider variation in piston ring wear is probably due to differences in plate thickness. From these tests there would seem to be little to choose between the two combinations. The tests reported here are not comprehensive enough to be conclusive, but our general field experience has confirmed the fact that cylinder wear is considerably reduced when a chromium plated ring is used.

Presented Here Are Abstracts of Five Technical Papers from Recent SAE Meetings

Increasing the Thermal Efficiencies of Internal Combustion Engines

By J. M. Campbell, D. F. Caris and L. L. Withrow
General Motors Corp.

IT HAS long been recognized that the efficiency of spark-ignition engines can be improved substantially by raising the compression ratios. Also, for many years it has been recognized that knock was one of the limiting factors to high compression ratios.

Fig. 5 shows some observed effects of increased compression ratio in experimental automobile engines upon fuel economy and octane requirement. In this figure, per cent gain in miles per gallon is plotted on the vertical axis against Research octane number on the horizontal axis. Each symbol in Fig. 5 represents a different experimental engine that has been built and road tested in comparison with a corresponding 1946 or 1947 standard production car of the same approximate weight and price class. The compression ratios of the different experimental engines are given inside the symbols used to denote the points.

The comparisons in Fig. 5 are necessarily an approximation based on overall driving experience. On this account each point has been plotted as a large area indicating the order of magnitude of the gains in tank mileage made by each engine. The different values on the figure are somewhat inconsistent with each other because of the fact that different experimental engines have been compared with different baseline engines. Moreover, the comparisons were made by different groups of engineers. Finally, it is important to note that car performance was not sacrificed in making any one of the comparisons shown in the figure. By the term "performance" is meant the acceleration, hill-climbing ability and general response of the car. In every instance, this factor was at least as good as, if not better than, the corresponding production car. This is an important consideration in making such comparisons because experience has shown that the public is reluctant to accept a new design that is not as good as, or better in every respect, than previous models.

The figure, therefore, shows the practical gains in fuel economy which are to be had without in any way sacrificing customer acceptance of the product. For example, the 10:1 compression engine operating on a fuel of about 98 Research octane number was 40 to 45 per cent more economical in its use of fuel than the corresponding 1947 production car which required a fuel of approximately 85 Research octane number.

Two other engines denoted in this figure as 8 to 1 compression ratio represent completely new designs. A compression ratio of 8 was chosen for these engines because they could be operated

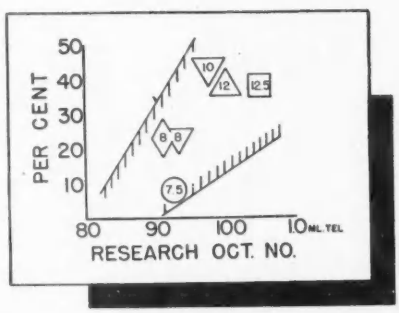


Fig. 5. This figure shows the increase in miles per gal based on 1946-47 production cars.

with some of the better premium grades of gasoline which have been sold commercially since the war. With these fuels, gains in economy as high as 25 per cent were realized.

In conclusion then, Fig. 5 shows that gains in fuel economy in the order of from 10 to 25 per cent are possible at octane levels not much above those established by some present premium gasolines, and that still greater gains can be made at higher octane-number levels. These gains have been demonstrated repeatedly in several engines all using the high-compression principle plus engine design changes incident to

the use of higher compression ratio and supported by thousands of miles of operation in different makes of car and under a wide range of conditions.

Air Brakes—Design and Performance

By Stephen Johnson, Jr.
Bendix-Westinghouse Automotive Air Brake Co.

CONSIDERING the subject of braking as an art capable of being reduced to a more or less exact science, we find that it is a big proposition. It can be said that the air brake ranks high among those forces to which the material developments of highway motor transport of the present day are primarily due.

The problems of deceleration, retardation and the flexible control of automotive vehicles must and will receive more and more attention from a scientific and technical standpoint, in order that theory and practice be combined to produce the best results. This is necessary if the brake is to satisfactorily meet the conditions which have developed in automotive transportation. The relatively high speeds and vehicle weights of the present day require that advantage be taken of every opportunity offered to increase and flexibly control braking power.

Starting and stopping of automotive highway vehicles are complementary factors in the problem of meeting transportation schedules, so it is evident that best results can be obtained only where both factors are given due consideration. Generally the starting factor is the only one fully considered or, at least, the one more fully provided for and this notwithstanding that better results can be obtained if both are considered and an efficient brake system installed.

In another sense the question of stopping is the most important, as the safety of the service and freedom from delays to a great degree, depend upon it. The measure of the value of the brake is twofold—first, the ability to stop in the shortest possible distance when necessary; and second, to permit smooth and accurate stops in regular service operation—therefore both these factors should be considered in the brake design and application of the brake system on the vehicle.

Unfortunately the brake is usually looked upon as a safety device only and we believe it is because of the prevalence of this idea that its installation and maintenance do not receive the consideration it merits. Considering the investment, there is no part of the vehicle that will give greater material returns than the brake when properly installed, operated and maintained. If the brake system could be separated from the idea or impression that it is a safety device only and proof advanced to show that: (1) Without its aid, heavy duty transportation of passengers and freight, as we know it today, would be impossible; (2) It makes possible faster and more frequent service —as much or more than does the engine power of the vehicle itself, or the highway itself; (3) If given the consideration it should have, it would increase the possibilities, profits and value of all these things—then, we believe, its importance would be more fully appreciated and at least the same consideration would be given to its design and installation as is accorded to other components of the vehicle. As a safety device the air brake is par excellence, but it has other reasons for its existence.

There are cases where not enough attention was given to the brake installation until after the vehicle was designed —then the brake installation had to be made the best way it could, and sometimes the worst way. It may be asking too much to expect that the vehicle be built around the brake installation, but as a matter of fact, if maximum economy, efficiency and safety are to be assured, this is at it should be. A proper brake system design and installation must include certain well defined provisions and if they are not possible of incorporation after the vehicle has been designed, the brake efficiency will suffer accordingly, and a prolific source of trouble may have been embodied in the design as a whole.

Applications of Hydraulic Transmissions

By R. M. Schaefer
Allison Division, General Motors Corp.

IN ANALYZING what possibilities hydraulic transmissions might offer the tractor industry a division should be made into two groups:

TRACKLAYING TRACTORS—The mechanical transmissions now being used in this equipment are rather complex. For example, two of the most popular tractors have the following ratios; six speeds for a 3.0 total ratio coverage between 1.7 and 5.1 mph and eight speeds for a 4.0 total ratio coverage between 1.6 and 7.8.

The effort is evident to make use of maximum power for all possible operating conditions. The torque converter permits operating the engine at a higher power factor and provides more power under variable load conditions with a minimum of attention on the part of the operator for speed selection, shifting, etc.

In the larger vehicles, Allis-Chalmers has broken the ice on their HD-19 now using torque converters as standard equipment. Judging from the success of this vehicle and the acceptance of the converter in Ordnance equipment, it is only a matter of time until converters in one form or another will be more widely used in tracklaying tractors in connection with hydraulic transmissions having fingertip control and constant torque shift. Considering the large number of hours the average tractor is operated per year, first cost is often of secondary importance if the ability to do more work permits a rapid return on any extra cost for this equipment.

WHEEL TRACTORS—Here the picture is very different. Although 10 to 12 times as many wheel tractors are built, 66 per cent are under 25 hp. The average price of farm tractors in 1947 was $815.00.

Studying the operation of an average farm tractor, the advantages normally attributed to a hydraulic transmission are difficut to apply. The average farm tractor is only operated for a few hundred hours a year and quite often at a low power factor, so the possibilities of earning back any additional first cost by doing more work in less time become rather remote. A farm tractor is usually started in the gear in which it is operated, so shifting does not become a problem.

The only conceivable way that a hydraulic transmission would become attractive for wheel tractor use is to build some combination into the vehicle which, through the hydraulic drive, will produce advantages that otherwise would not be available. The fact is that, 10 years ago, anyone making the statement that a torque converter would be used in a passenger car successfully would have been laughed at—yet today there are thousands.

Heavy Duty Brakes—What's New

By Ralph K. Super
Timken-Detroit Axle Co.

THE last ten years have been the most productive of progress in vehicle brakes since the introduction of four wheel brakes. Actuating systems also have made considerable progress. The trend toward full power brakes has been accentuated by a demand for less driver fatigue and the necessity for brake operating power far beyond manual power considerations. The problem of control is increasingly important as it determines to a large degree the amount and distribution of brake power which

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AIRBRIEFS

By ROBERT McLARREN

70-Group Battle Again

Government agencies have known for many years that they start virtually from "scratch" each new fiscal year in their budget hearings on Capitol Hill. But the year-old Air Force has not learned this lesson yet and may have already started its fiscal 1950 pressure program too late, for current signs point to scuttling of the program by the 81st Congress due in January. The Budget Bureau has nailed a tight $15 billion lid on the fiscal 1950 National Defense budget, yet none of the Services can carry out their current programs with $5 billion. In addition, Secretary Forrestal, who makes up the Department of National Defense budget, has already started toying with $5—$5.2—$4.8 relationships with the Navy holding the top figure. But even a $5.2 or even a $5.5 billion budget for the Air Force (over violent objection by the Navy) would not continue the 70-Group program laid down last year. A flat $5 billion would give the Air Force only about 50 groups and result in a 30 per cent slash in aircraft industry production programs. The "strings" on the Air Force procurement program are already beginning to tighten!

Missiles Have New Look

Shortly after V-J Day observers were treated to startling predictions of supersonic rocket missiles many, many times bigger, faster and more deadly than the vaunted Nazi V-2. Actually, work commenced in that direction but now, three years after, there's an altogether "new look" in guided missiles. First of all, they're subsonic and gaited to a "conservative" 600 mph speed. Secondly, they use the now-tried and trusted turbojet engine. Thirdly, they carry enough TNT in their nose to really do some damage, not the 1000 lb accommodatable in the rocket missile. Actually, both Services agree that in another two or three years the layman will be unable to distinguish between a piloted fighter and a pilotless guided missile; both will be about the same size, feature sweptback wings, multi-jet engines and produce about the same performance. It's the only way yet discovered to deliver 8000 to 12,000 lb of TNT about 5000 miles away, something the rocket missile may never be capable of doing!

Plastic Tools

Republic Aviation Corp. has lifted the lid from a new development—plastic jigs and fixtures—that may foment a mild revolution in the manufacturing industry. Republic engineers have demonstrated that plastic jigs and fixtures cost less, are longer-lasting, more accurate, easier to fabricate, less subject to shrinkage, easier to rework or repair and much easier to duplicate in quantity than those made of steel. The new tooling is made by laying resin-impregnated Fiberglas strips across plaster molds of the parts to be fabricated, heating the assembly under pressure and removing from the mold. Although Republic experience to date has been confined to drill jigs, assembly fixtures, and similar equipment, the application of plastic materials to forming operations is being studied. Republic is already saving at the rate of $200,000 per year by the use of plastic equipment and this rate is expected to increase as experience and new applications are obtained.

Home At Last

The Wright Brothers Flyer now rests in the place of honor inside the main entrance of the Smithsonian Institution in Washington, D. C. And thus ends the greatest historic controversy in aviation. The Institution had long held that the Langley Aerodrome was the first airplane "capable of flight" since, although it failed in its 1902-03 tests, it was flown successfully in 1914 by Glenn Curtiss. It later developed that Curtiss had made very extensive changes in the design and construction of the tandem wing Langley machine, which rendered it virtually a new airplane. In pique, Orville Wright sent the machine to the South Kensington Science Museum in London in 1928 and there it remained until last month when, in accordance with the Wright will, it was hoisted into place in the Smithsonian. Assuredly this is America's most precious aviation heirloom and one to be treasured throughout the ages.

What's Wrong With The Lightplane?

That has been a question as perennial as the weather since the early 'Twenties and the one sure-fire topic to program on any aviation meeting, when the committee chairman runs out of ideas. As exhaustively as it has been treated in the past quarter-century, it was still brought up for debate at the recent Cleveland convention of the Aviation Distributors and Manufacturers Association. Ringmaster was Fred E. Weick, noted lightplane researcher and now director of the Texas A&M College aeronautical laboratory. Weick says what is most needed now is: a plane that will fly straight, controls-free spin recovery and cockpit design for crush injury protection. But he also threw in the familiar "high lift devices for short takeoff and landing," "adequate control at the stall" and "spin prevention" topics as continuing subjects for research.

You Design, We Build

An interesting comment on the wide latitude now available to the lightplane designer, the present high state of research and development and the opportunities open to the designing fraternity is contained in the news that Sentinal Aircraft, Inc. has been formed in Ann Arbor, Mich., to produce the eight-year old Stinson Grasshopper liaison airplane. The North American Navion is now being built by Ryan Aeronautical Corp., the Globe Swift by Texas Engineering and Manufacturing Corp. and C. G. Taylor is trying to get his 12-year-old lightplane into production. While the engineers discuss what highly technical improvements can or should be incorporated, pilots convene to formalize their personal desires in handling characteristics and promotion men ready new programs outlining special new features in upcoming designs, the cold, hard cash in the industry is being placed on the years-old, tried-and-true designs whose development costs have already been written off! William T. Piper rejected three separate postwar prototypes of unusual design in favor of his trusty Cruiser and its painfully conventional but dependable features. Until the men with pencils and the men with money start talking the same language, the years-old "You design—we build" tug-a-war of the lightplane industry will continue.

National Strike Settled

The airline business certainly won't be the same now that the Air Line Pilots Association strike against National Air Lines has been settled. No more skywriting, picket lines with $10,000-per-year men, hearings, suits or counter-charges—but like all strikes, who won? The pilots principal grievance, now thoroughly obscure, was that an NAL pilot, who was fired, deserved a new hearing! The pilot will now get his hearing and that, presumably, will

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NEW

Production and Plant

EQUIPMENT

For additional information regarding any of these items, please use coupon on page 60

M-137—Drilling, Boring, Tapping Units

New Natco Models C2FT, 3CFT and C4FT Holesteel floor type units brought out by National Automatic Tool Co., Richmond, Ind., are production machine tool units designed to incorporate in the construction of way type machines for drilling, boring, tapping and like operations. Dependent upon requirements, they are arranged with standard single spindle heads, fixed center multi-spindle heads, or adjustable multiple spindle heads complete with either standard adjustable spindles or slip spindle plates and spindles. The electrically controlled hydraulic feed system provides an infinitely variable feed section within the specified range. Electrical push button control provides for routine set-up control.

The bed is a cabinet type heavy box structure which prevents deflection under heavy thrust loads. Ways are of close grained high tensile cast iron. The head slide for mounting the spindle heads is guided on the bed ways and is provided with gib adjustment. The ways are automatically lubricated at each cycle of the slide.

The single spindle head is direct motor driven and antifriction mounted. Sliding gears, which are lever operated, allow a selection of seven spindle speeds within the range selected through splined pick-off gears.

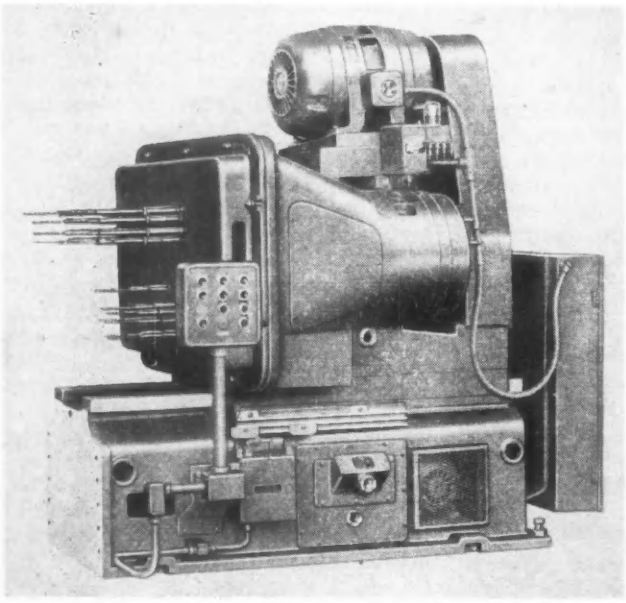
Adjustable spindle heads are of anti-friction mounted construction, in which each spindle drive has independent spindle speed changes, which provide high and low speed and a neutral position. A cascade system is employed to lubricate the head. The spindles are driven by Natco universal joints of the hardened and ground solid trunnion type.

Adjustable spindles may be located in any position within the area of the head and a drive angle of 35 deg or less. Vertical adjustment of 2 in. is used to compensate for tool wear or difference in length. Fine adjustment through a screw allows facing and depth setting with accuracy.

Slip spindle plates, used in conjunction with the multiple head drives, are advantageous for high production small lot jobs.

Fixed center multiple spindle heads, designed for individual requirements, are antifriction mounted where center distances will permit. A cascade lubrication system provides lubrication for all bearings and gearings. Combination drilling and tapping heads are provided with an independent reversing type motor for the tapping spindles.

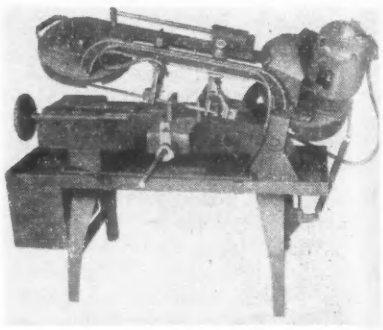
The slide power cylinder is mounted between the ways and through a control system provides a cycle sequence of rapid advance, coarse feed, fine feed, rapid reverse and stop. A tandem pump located within the reservoir in the cabinet base supplies fluidpower for rapid traverse and feed movement. The pump is driven by a motor through "V" belts. A delayed reverse may be furnished to provide a dwell at the end of the feeding stroke, and for accurate facing to depth operations.



Natco Model C4-FT Holesteel floor type machine

M-138—Self-Contained Wet Cutting System

A new self-contained wet cutting system offered by the Wells Mfg. Corp., Three Rivers, Mich., is now available for the Wells No. 5 utility model horizontal metal cutting band saw. It is similar to those used on Wells Models No. 8 and No. 12. Portability is retained. The full area chip pan is mounted between the bed and legs. The complete system includes fluid tank with centrifugal type pump-motor unit and a screened intake, as well as tubing and a conveniently located flow control valve.



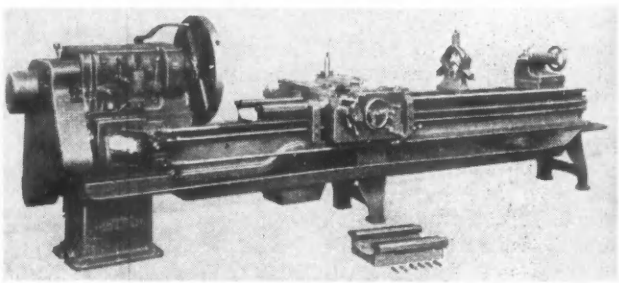
Wells No. 5 horizontal metal cutting band saw

M-139—Fixed Gap Bed Lathes

A new series of "fixed gap bed" lathes in addition to their line of regular "standard" and "tray top" motor driven geared head engine lathes, is offered by the Cincinnati Lathe & Tool Co., Cincinnati, Ohio.

Standard (medium duty) fixed gap bed Cintilathe is offered in six nominal swing sizes— 14 in., 16 in., 18 in., 20 in., 22 in. and 24 in. with distances between centers from 30 in. and up in increments of 24 inches. Motors supplied as standard are 14 in.—3 hp; 16 in.—5 hp; 18 in.—5 hp; 20 in.—7½ hp; 22 in.—10 hp; 24 in.—15 hp.

Tray Top (light duty) fixed gap bed Cintilathe is offered in two nominal swing sizes—15 in. and 18 in. with distances between centers from 18 in. and up in increments of 6 inches. The motors supplied as standards are 15 in.—2 hp; 18 in.—3 hp.

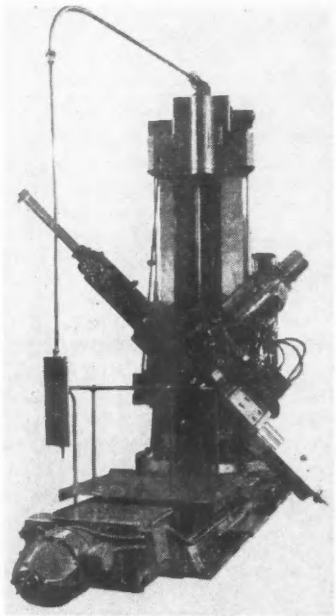


Cincinnati fixed gap bed Centilathe

The Gap lathe carriage on the Standard as well as the Tray Top line of lathes is provided with short wings on the headstock end. The short wings provide maximum approach of the tool to the gap with minimum overhang in the gap. The wings on the tailstock end are generously extended to provide bearing surface on the bed and to provide rigidity of the carriage unit.

M-140—Universal Traveling Head Planer

Especially arranged for shaping, planing and slotting only, a new universal traveling head planer has been brought out by the Morton Mfg. Co., Muskegon Heights, Mich. The planer has 65 in. extreme length of cutting



Morton universal traveling head planer

stroke with 48 in. of vertical feed on the column and a bed approximately 17 ft long providing 10 ft of horizontal travel. The column will rotate 360 deg and the ram is adjustable 25 deg either way from horizontal position.

A 9 in. square forged steel ram provides rigidity in heavy duty shaping, planing and slotting. A ram bearing surface of 60 in. is provided in the saddle. Standard draw-cut shaper head has 6 in. of hand feed and uses 1½ in. by 2 in. cutting tools. The unit can be equipped with jib crane with either manual or electric hoist. Push cut and pull cut slotter bars aid when working in small openings.

M-141—Perforator Grinding Attachment

A perforator grinding attachment, the Grind All Fixture, is announced by the Harig Mfg. Corp., Chicago, Ill., said to embody time savings up to 300 per cent.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 60

With this fixture, produced by lamination die technicians, all types of regular and irregular contours may be ground. Many irregular shapes concentric with shank may be ground within ±.0002. V-Block located in a T-slot in center of the index plate can be adjusted to any desired position within ±.0002. Index plate has 24 15 deg graduations with ±.0002 accuracy.

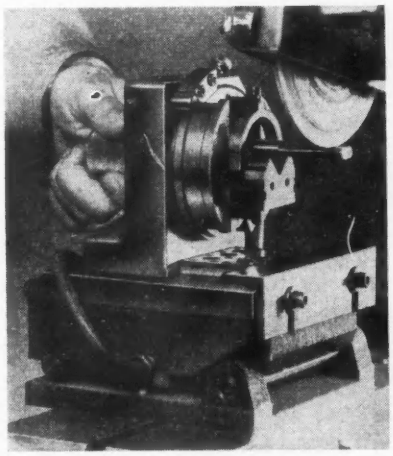
The Grind All Fixture may also be used for concave and convex radius dressing and because of its radius generating feature may be particularly applied to the grinding of carbide.

M-142—New Drilling Machine

A new drilling machine known as the Model D is offered in 24 in. and 28 in. swing by the Sibley Machine & Foundry Corp., South Bend, Ind.

The new Model D features V-belt drive direct from the motor to a 4-speed geared transmission which is part of the top frame assembly. Ease in changing speeds is gained by an "inching" button on a 4-station switch at the front of the machine, and the handy position of the 4-speed transmission lever.

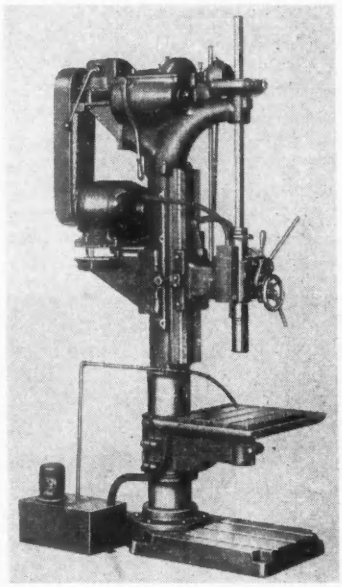
Three optional ranges of spindle speeds are available for Models D-24



Harig perforator Grind All Fixture

and D-28 drilling machines: 21 to 365 rpm; 25 to 419 rpm; and 37 to 650 rpm.

Spindle quill bearing in the head is split and is easily adjusted to compensate for wear. Motor is 5 hp—NEMA Standard Type for normal operations. The drive provides ample spindle power for the recommended capacity of 1¾ in. in mild steel. Machines are equipped with electrical reversing for tapping operations.



Sibley Model D drilling machine

A 24 in. head travel on column and an 11 in. spindle feed are provided. The table arm and table rotate on the column, making the base accessible for a working surface, which is heavily ribbed, machined and provided with T-slots. The sliding surface of the column, as well as the bearing area of the head, are hand scraped to obtain exact alignment when the head is locked at any position. The head is adjusted by the rack and pinion elevating device.

Feed mechanism is driven directly from the main drive shaft, through a steel feed worm and bronze worm gear. For greater strength the rack pinion and shaft are made in one piece from a solid bar of alloy steel. Four feed changes are obtained by a sliding shaft in the center of the hand wheel. An adjustable stop collar on the graduated quill trips the feed at any desired depth.

M-143—Second Operation High Speed Machine

Hardinge Brothers, Inc., Elmira, N. Y., present a new model high speed precision second operation machine with stationary style collet, known as model VBS. The new unit combines all features of their standard model DSM59, with addition of a stationary collet feature consisting of No. 21 Brown & Sharpe style collet.

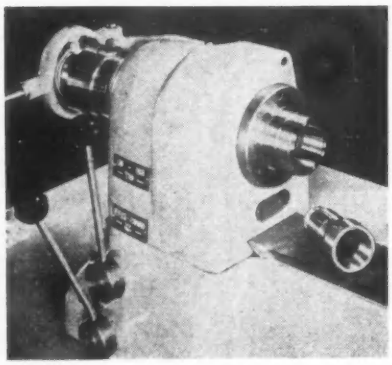
NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 60

The stationary collet feature is said to particularly fit the need when close tolerances exist for length or shoulder specifications where push-out or draw-in collets are not as satisfactory.

The preloaded ball bearing center-drive headstock spindle offers 1 in. round, ⅞ in. hexagon and ¾ in. square collet capacity. Eight spindle speeds are available in either forward or reverse direction from 230 to 3500 rpm. Three other speed ranges are available for varied production requirements.

Other features are precision hardened and ground dovetail bed ways, constant full bearing double tool cross slide, automatic indexing six-position preloaded ball bearing turret, self-draining oil pan with integral sump and welded steel pedestal base.



Hardinge model VBS high speed second operation machine

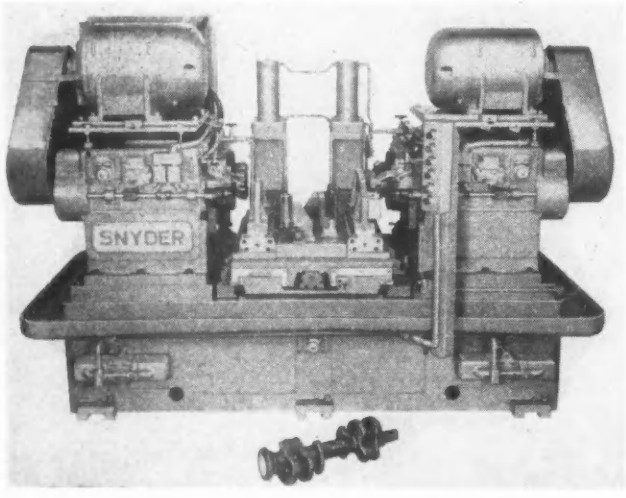
M-144—Special Unit For Crankshaft Forgings

A special-purpose machine designed and built by Snyder Tool & Engineering Co., Detroit, Mich., faces and center drills the ends of crankshaft forgings at the rate of 47 pieces an hour at a claimed 80 per cent efficiency.

The forging is located in the fixture manually and held by means of hydraulically actuated clamps. When the cycle button is pressed the fixture table advances rapidly toward the milling cutters and drops into feed, and both ends of the forging are faced to correct over-all length. Milling spindles are Timken bearing mounted. Inserted carbide milling cutters are used at a speed of 350 fpm.

The fixture table then returns to centering position and hydraulically actuated quills carrying the centering tool spindles advance and drill centers in both ends of the forging. Centering drills are high speed steel operating at a tool speed of 60 fpm.

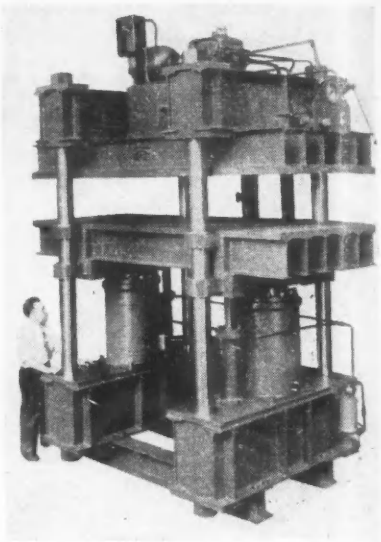
The machine is adaptable to a wide range of part lengths and fully adjustable in speeds and feeds. The stroke is adjustable from 8 in. to 12 in. Drive is through belting and helical gears and power is supplied by a single 15 horsepower motor. Base is welded steel construction, thoroughly normalized and ribbed for rigidity. Coolant tank is separate. Required floor space is 108 in. by 70 in. Work cycle is fully automatic.



Snyder special-purpose machine for facing and center drilling ends of crankshaft forgings

M-145—Up-Moving Forming Press

Designed for special forming, this HydroLectric press of the R. D. Wood Co., Phila., Pa., is adjustable in tonnage between 85 and 350 tons. The press is complete with motor-driven pumping unit, control valves and piping, with pump volume and press speeds adjustable from zero to maximum. The pumping unit, mounted on the top platen is a 14.7 gpm, 2,000 psi radial piston pump driven by a 15 hp electric motor.

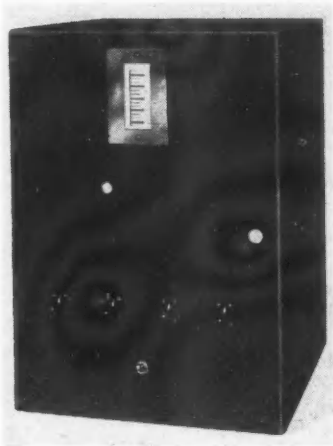


R. D. Wood HydroLectric up-moving forming press

M-146—Three-Channel Indicator

Automatic Temperature Control Co., Inc., Phila., Pa., has recently placed in production a new precision measuring system called the standard "Atcotran" 3-channel indicator. Said to incorporate the longest available scale—72 inches—it accommodates any one or any group of "Atcotran" pressure measuring cells, such as a Bourdon tube, bellows, or differential bellows for flow, incorporating simple electrically transmitted intelligence to one focal point for accurate readings.

Three bands, selection being made from switches on the front of the case,



"Atcotran" 3-channel indicator of the Automatic Temperature Control Co.

may be calibrated either linearly for any range required, or in square root scale for flow, etc. Each scale is 72 inches in length and moves full range in less than two seconds. Dead-beat response with 5000 positive motor-driven positions is a feature. Accuracy is claimed within ¼ of 1 per cent of reading (not total scale range).

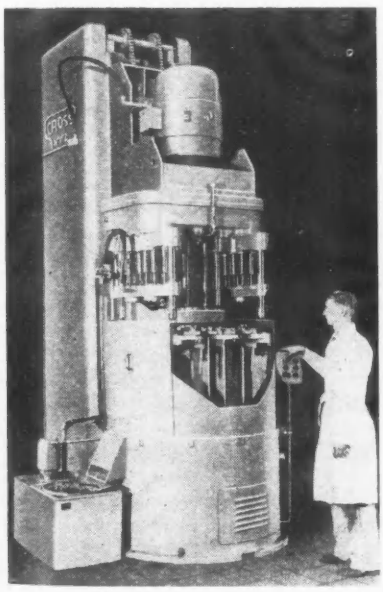
Zero adjustment is accomplished with screw on front of case. Indicator is a null balance instrument with zero checking simplified since in null position the indicator is always in center scale. No "stops" are used. Selector switches up to a maximum of 40 can be mounted on the front of the indicator case. Since voltage output is produced on pressure measuring cells, several measurements may be either added, subtracted or divided. This permits close checks of pressure from numerous points in a given process. By depressing any two selector switches the difference between such two points of pressure may be accurately read in one second, according to company claims.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 60

M-147—Axle Shaft Flange Driller

A special machine just completed by the Cross Co., Detroit, Mich., drills, countersinks, and reams five holes in the flanges of automobile rear axle shafts at the rate of 225 pieces hourly. It is a 4-station, power operated, index table type, with an independent loading station. At Station 1, the flange is drilled. At Station 2, it is counterbored, and at Station 3, reamed. Two pieces are handled at each station. Independent floating work holding fixtures insure concentricity between the holes and the pilot diameter, while flexibility for part design changes is provided through the use of a standard Cross column and index table. Steel ways are hardened and ground. Feed and rapid traverse are hydraulically operated. Control of the automatic work cycle is by push-button.



Cross 4-station special machine for operations on automobile rear axle shafts

M-148—Floor Model Band Filing Machine

Speedy accurate file finishing—nine times faster than hand filing—is claimed for the new DoAll floor model band filing machine, put out by the DoAll Co., Des Plaines, Ill. Designed to be operated by a person either seated or standing, the new table height is 39 in., extending 18 in. square.

The machine frame is of unit welded steel construction, completely enclosing all moving parts. Access to the interior is obtained by opening a single door, exposing both upper and lower wheels. Motor and drive compartments are isolated by a solid steel sheet that keeps chips and shavings out of the mechanism. A ½-hp. motor drives an enclosed worm reduction gear governed by a Speedmaster variable pulley. Optimum cutting speed for any material is instantly available by turning a handwheel on the Speedmaster which controls surface travel of file band between 50 to 250 ft per minute as shown on a speed indicator.

Speed is available for all types of work and filing capacity is increased to 7 in. Improved construction eliminates the bar frame file guide support, affording unimpeded work area all around the file band of advantage in internal filing.

Tilting mechanism permits accurate level, mitre or angle cutting. When set with a protractor or sine bar the table stays put as long as desired, swinging back to 90 degrees when the lock is released.

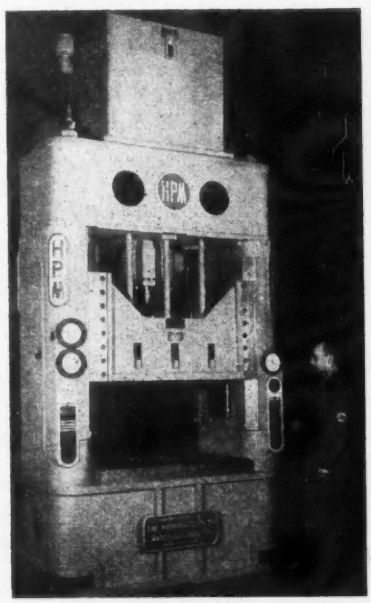
Band length has been increased to 120 in. with three band sizes available, in widths ¼ in., ⅜ in. and ½ in. in six types of cut, flat, oval or round shape.

DoAll floor model band filing machine

M-149—Single Action Forming Press

One of the most recent developments for the rapid deep drawing and forming of sheet metal is the new 100-ton H-P-M Fastraverse single action press, designed by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio. It is an all-hydraulic, self-contained unit with a 48 in. by 36 in. platen, 30 in. daylight and an 18 in. main ram travel. Located in the press bed is a 33-ton hydraulic die cushion with a 32 in. by 25 in. platen and 7 in. stroke.

The press frame is a combination of castings and weldments consisting of a



Hydraulic 100-ton Fastraverse single action deep drawing and forming press

head and a bed, spaced by a pair of uprights. Two pre-loaded tie rods, passing through each upright, lock the assembly together as one solid unit. The uprights are accurately aligned with head and bed by special circular keys.

The head incorporates the hydraulic cylinder with power ram which actuates the main slide. This slide is guided by beveled ways on the four inner corners of the uprights through adjustable gibs, so positioned as to oppose any twisting of the slide. Three mechanical knockouts are built into the main slide.

The press closes and opens at a rate of 770 in. per minute. It automatically reverses at a predetermined setting and slows down prior to die contact. Pressing speed under full load is 146 in. per minute. Operating on a 12 in. working stroke and building up 100 tons pressure on a solid surface, this press will cycle approximately 20 times per minute.

This H-P-M press is equipped with an H-P-M closed circuit operating system and is powered with a 40 horsepower electric motor directly connected to an H-P-M radial piston type pump. Oil is used as the hydraulic pressure medium. Only one hydraulic pump is required for operating the press slide and die cushion.

Three methods of operation are provided—manual, semi-automatic or full automatic. Change-over from one method of operation to another is quickly made by the operator at the electric control station.

M-150—Critical Checker For Diesel Pistons

Simultaneous check of 11 critical dimensions and determination of one of five skirt diameter classifications of diesel pistons are now quickly accomplished with the Multichek, offered by the Sheffield Corp., Dayton, Ohio. Interchanging the gaging points and locating cups permits any of 13 different pistons within 3¼ in. to 4¾ in. dia group to be accurately checked and classified.

The master light, by changing from red to white, shows the operator at a glance whether all dimensions are within specified tolerance limits. Individual signal lights enable the operator to determine whether dimensions being checked are under or over tolerance limits. The "Electrigage Head" mounted in the base casting permits easy classification in any of the five different classification ranges, according to the skirt dia.

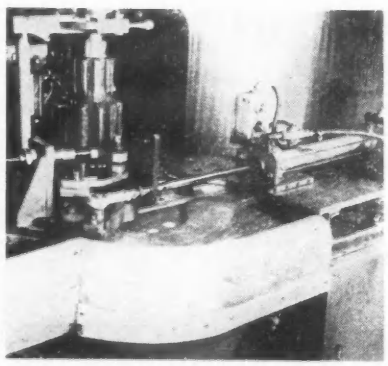
Sheffield Multichek for critical measurements of diesel pistons

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 60

M-151—Gear Tooth Hardening Unit

A completely automatic, heating, quenching and indexing unit for hardening of gear teeth by induction heating—one tooth at a time—has been developed by the Induction Heating Corp., Brooklyn, N. Y. Handling operations involve only the insertion and removal of gears.

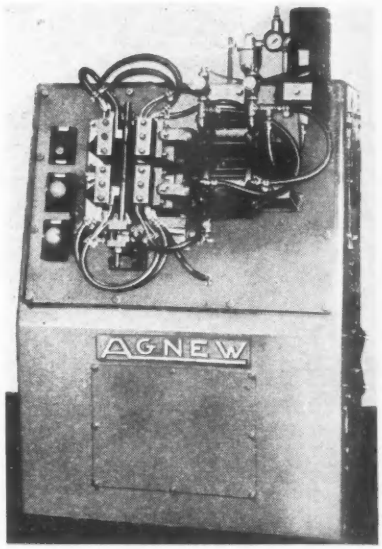


Induction Heating Corp. automatic heating, quenching, and indexing unit for hardening of gear teeth

Gears which, because of their size would require very large equipment to be hardened in one operation, can now be done with 20 KW equipment and the use of this machine, it is said. Gears ranging from 20 in. dia with a 12 in. face or larger, depending upon generator capacity, are accommodated by the unit. Individual teeth of a helical gear, carbon steel, 10½ in. P.D., 3 in. face with 46 teeth can be heated and quenched in 7 seconds to Rc hardness 50 to 64, the company claims.

M-152—Resistance Heating Machine

A resistance heating machine for localized annealing of truck transmission shifter shafts, which have been carburized and hardened and are to be straightened prior to grinding has been designed and manufactured by Agnew Electric Company, Milford, Mich. Designated Model RH-1, it is of the single station air operated type. The machine is suitable for heating from ⅜ in. to ⅞ in. dia by from 1 in. to 7½ in. long.



Agnew Model RH-1 resistance heating machine

The machine consists of a fabricated steel frame-work on which are mounted work clamps which are operated by double acting air cylinders and which are connected to a 50 kva resistance heating transformer through flexible secondary leads. Clamps, dies, and transformer are water cooled. A solenoid water valve is provided in the water circuit so that when the machine is stopped the water is automatically turned off.

The resistance heating transformer is initiated by a pressure switch through a magnetic contactor. After a predetermined period has elapsed, controlled by a pneumatic timer, the magnetic contactor is de-energized turning off the resistance heating transformer. Regulator switch is provided on the transformer primary to secure different heat steps for various sizes of material. The double acting air cylinders are controlled by a solenoid air valve and a strainer, lubricator, regulator and gauge is provided in the air inlet line. Mushroom-head start button is provided to initiate the cycle.

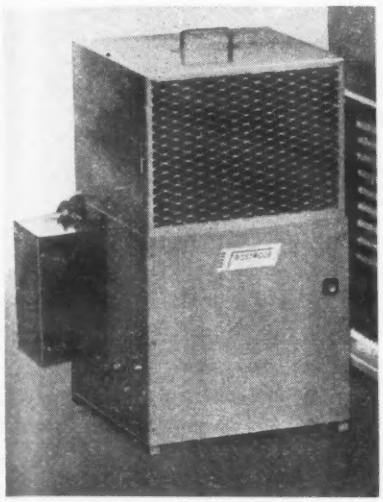
NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 60

M-153—Self-Contained Coolant Cooler

A 5 gallon per minute coolant cooler Model 50-AC, for grinding, honing and machining operations, has been added to the line of Frostrode Products, Hazel Park, Mich.

The new 50-AC is a companion model to the larger (15 gallon per minute) Frostrode coolant cooler (Model 75-AC) and is designed to continuously maintain coolant temperature at a maximum of 20 deg below room temperature at rated capacity. Completely self-contained, it comes as a package unit, wired and ready for connection to all types of machine tools. No water connections are necessary.



Frostrode Model 50-AC coolant cooler

Operation is by a ½ hp motor integral with the hermetically sealed compressor unit. The evaporator, employing Freon F12, is of single copper tube coil type with spiral counter-flow. Pressure drop in this unit is less than 5 lb at maximum output of coolant flow.

M-154—Hydraulic Turret Press

A hydraulic turret press announced by the Rettig Engineering Co. to be distributed through the Universal Air-Line-Joint Mfg. Co., Lafayette, Ind., is designed as a fast press, said to practically elimiate tear down and set-up time. It is claimed especially adaptable on short runs where a schedule per day, week, or month is required.

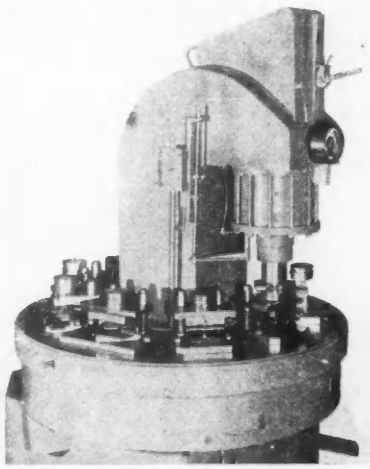
This press has a large turret table that will accommodate as many set-ups (depending on their size) as will fill the table. After initial mounting of fixtures the operator in a minute's time, can change from one fixture to another whether the operation is blanking, forming, drawing, swedging, assembling, etc.

The presses are built in three sizes, 10, 20 and 30 ton and may be operated either automatically or manually. All packing is eliminated in the hydraulic pump unit, assuring continued operation and no down time from failure of packing. Turntable is rotated by manual operation. Hydraulic pump is self-contained. The press, frame and turret table are fabricated steel. Turret table is mounted on rollers. Heavy hydraulic tubing and flair type fittings are used.

It is equipped with electric limit control, electric overload control, and magnetic power valve submerged in oil, magnetic push button starter and "Neoprene" insulated electric wiring. Power drive is V pulleys and B belts.

Turret table is 48 in. O.D. and 20 in. I.D. Ram stroke (either manual or automatic operation) is maximum 4⅛ in. and ¼ in. minimum. Turret table to ram dimensions are maximum 10¼ in., minimum 6⅛ in. Slug clearance hole in bolster plate is 4½ in. by 4½ in. Base is 38 in. by 32 in. Projected floor space 48 in. by 56 in. Height of turret table from floor 37¼ in. with overall height 83½ in. Reservoir cap. 19 gal.

Made in three sizes: No. 10, 20,000 lb ram load, is built in three models varying from 4740 to 9400 strokes per hour. No. 20, 40,000 ram load, is built in three models varying from 4080 to 8200 strokes per hour. No. 30, 60,000 lb ram load, affords 3600 strokes per hour.



Rettig hydraulic turret press

M-155—Universal Checking Fixture

A Universal "Sine-Line" checking fixture, Michigan model 471-A, for checking gears, gear blanks, hobs, worms, worm blanks, milling cutters and form tools up to 10 in. O.D. and 8 in. maximum face width, has been introduced by Michigan Tool Co., Detroit, Mich.

Michigan Model 471-A checking fixture

With indicator assemblies available, this single fixture can be used to accurately check tooth spacing, pitch radius, concentricity and taper of spur and helical gears, plus parallelism and crowning of spur gears.

The Universal fixture may also be used to check flute spacing, radial or off center sharpening, depth of form, parallelism of straight flute, O.D. eccentricity, and the amount of form relief on form and milling cutters; plus flute spacing, radial or off center sharpening, parallelism of straight flute, lengthwise taper, concentricity of proof diameters, multiple thread spacing or axial lead, and pressure angle of hobs; also tooth depth and concentricity of topping hobs.

With the two standard indicator assemblies furnished with the Model 471-A, tooth spacing, pitch radius, concentricity, and taper of spur and helical gears may be checked. The standard indicator assemblies will also check the outside radius and concentricity of gear and worm blanks.

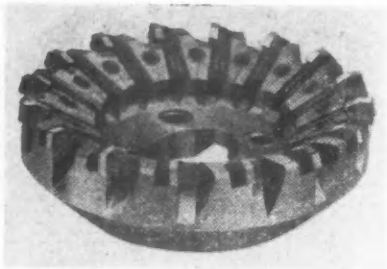
An additional indicator assembly will check parallelism and curve-shave (crowning) contour of spur gears. Two special indicator assemblies are available to check thread spacing and pressure angle of worms.

A feature of the machine is the use of Carboloy cemented carbide tipped cones for the cone check of pitch radius, concentricity and taper of spur and helical gears.

The lower sub-assembly of the indicator base travels lengthwise on its anti-friction bearings, with safety stops provided to limit travel.

P-118—Heavy Duty Face Mill

The Gairing Tool Co., Detroit, Michigan, has added a heavy-duty model to their E-Con-O-Mill line of standard face mills. Designed for roughing operations, where the greatest wear occurs along the periphery of the tool, blades are set at an angle to allow greatest adjustment in a radial direction.



Gairing heavy-duty E-Con-O-Mill standard face mill.

Extra heavy cutter bodies are made 8-inch dia and over. All sizes are equipped fith the same size of tungsten carbide tipped blades, the same blades and same locks as used on the regular (cone-type) E-Con-O-Mill. Blades are of three types, for cutting steel, cast iron, and non-ferrous material and come finish ground, ready for work.

P-119—Long Platform Low-Lift Truck

A power industrial truck with platform 12 feet long and an unusually low-lift for its capacity is announced by Elwell-Parker Electric Co., Cleveland, Ohio.

The truck was developed to transport close to floor levels heavy loads of materials having large surface areas, such as asbestos boards which are placed on skids or supported on frames mounted on skids.

Weight of truck is 8000 lb; load-carrying capacity 20,000 lb; width of platform 32 inches. Top of the platform in lowered position is 11½ in. above floor level; maximum height elevated, 17 in. The platform is raised by means of two cylinders actuated hydraulically, operated by hand-lever control.

A feature is the multiple (4) sets of wheels under the platform. Hydraulic-power steering mechanism enables the driver easefully to turn the truck in 99½-in. aisle intersections. The truck is powered all-electric or gas-electric.

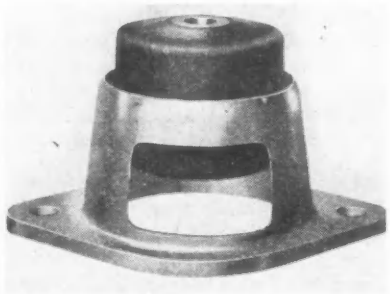
NEW ★ PRODUCTS

For additional information regarding any of these items, please use coupon on page 60.

P-120—Holder Type Snubbing Mountings

Lord Mfg. Co., Erie, Pa., has designed a new line of holder type vertical snubbing mountings for isolating vibration and controlling severe shock. Load capacity is from 120 to 310 lb per mount.

Frequencies from 700 c.p.m upward,



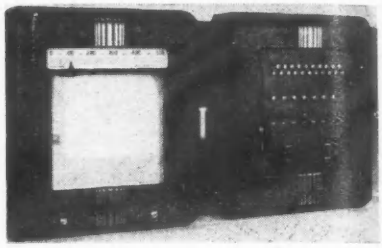
Lord holder type vertical snubbing mountings

the manufacturer states, are efficiently isolated at their source. Snubbing shoulders are inactive during normal vibration, but snub against steel washers when impact occurs, thereby cushioning shock. Washers prevent excessive movement and over-stressing of the flexing element.

Three series of mountings are available. Series 279 has a deflection limit of ⅛ in. under load; series 281, 3/16 in.; series 282, ¼ in. The flexing element is made of highest quality rubber or oil-resistant Neoprene, depending on the application. Metal parts of the mountings are steel.

P-121—Indicator For Multiple Temperatures

A new Speedomax instrument by Leeds & Northrup Co., Phila., Pa., automatically logs as many as 160 separate thermocouple temperatures in succession at a rate of 4 seconds per point. Because each point is checked



Leeds & Northrup Speedomax instrument which indicates and records 160 temperatures

at such frequent intervals, high or low temperatures which may develop can be spotted readily before serious trouble results.

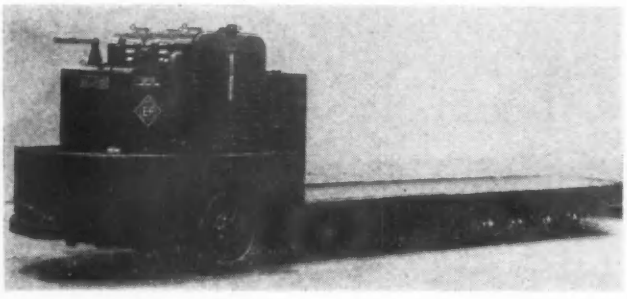
In case of trouble, the operator can cut thermocouples out of the measuring sequence in banks of 20 at a time, until the instrument is concentrated on the particular group of temperatures in which he is interested at the moment. Or, he can set the instrument to record any single thermocouple, or to record all points continuously.

In usual operation, the instrument simply indicates while numbered lights identify each couple. Should any temperature reach a preset limit, the Speedomax automatically starts its recording chart drive, begins to record all points as a series of numbered dots, and operates an alarm.

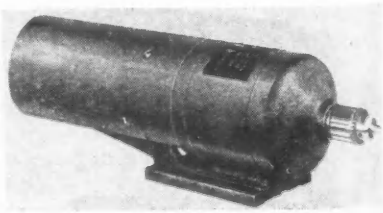
The equipment consists of two parts, a recorder and a switch assembly—both housed in separate cases.

P-122—Integral Type Drilling Unit

A drilling unit featuring a single rotating member is being built by Black Industries, Cleveland, Ohio, said to employ an entirely new principle, using a traversing motor shaft for the



Elwell-Parker industrial truck with extra-low platform 12 ft long.



Black drilling unit having single rotating member

"I like the UNIFORMITY of Inland Steel"

Electroplaters know how much time can be wasted in unnecessary grinding and polishing when the steel they shape and plate *varies* in surface structure. These men prefer steel that's *uniform*. That's why they like steel *made by Inland*. Uniform source of raw materials . . . uniform steelmaking procedures using the same modern equipment . . . uniform workmanship—made possible by Inland's completely integrated, closely knit plant—explain why the Inland steel received today will be of the same uniform quality as that received last month . . . or last year. INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

THE MEN WHO WORK WITH INLAND STEEL KNOW ITS QUALITY

INLAND STEEL

BARS • STRUCTURALS • PLATES • STRIP • TIN PLATE • FLOOR PLATE
PILING • REINFORCING BARS • RAILS • TRACK ACCESSORIES

work spindle. Because spindle and motor rotor are integral, torque is applied evenly around the spindle, allowing practically no end play.

Air feed gives rapid shockless advance to the work with hydraulic control from this point until the work cycle is completed. Feed of the drill is constant even when breaking through. The micrometer stop insures depth drilling accuracy to within .001 in. Stop control is readily accessible and calibrated for quick adjustment.

Drilling units from ¼ to 1 hp have the same base-to-center-of-spindle dimension. Ample space and actuating arm are provided inside cover for interlocking and auxiliary control devices. Speeds available are 840, 1150, 1725, 3450 rpm for voltages of 209, 220, 440, 550, 3 phase, 60 cycle. Standard units operate in any position and may be used for drilling, tapping, centering, chamfering, counterboring, countersinking, tube facing or flaring, reaming, hollow milling, rivet spinning or any application where a combination of rotating and traversing motions is required.

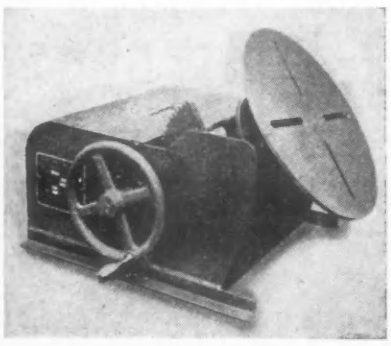
For heavy operations, these units can also be supplied up to 10 hp to operate at any standard polyphase induction motor speed.

P-123—Motor Operated Work Positioner

A motor-operated work positioner, driven by a hydraulic variable speed transmission and a ½ hp single-phase AC motor, has been introduced by Ransome Machinery Co., subsidiary of Worthington Pump and Machinery Corp., Dunellen, N. J. The positioner, known as Model I-P, has a load capacity of 100 lb. By its use, production is said to be increased up to 50 per cent because all welds are made in the down-hand position.

The table top on Ransome's Model I-P rotates 360 deg at variable speeds, adjustable from 0.5 rpm in either direction. It is manually tilted through 135 deg and locks at any degree of tilt by means of a worm-and-segment.

The Model I-P is suited for welding, hard surfacing, assembling, repairing, grinding, and similar operations because it places work in a position most convenient for the operator.



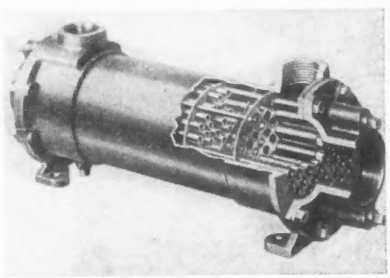
Ransome Model I-P work positioner

NEW ★ PRODUCTS

For additional information regarding any of these items, please use coupon on page 60.

P-124—Non-Ferrous Heat Exchanger

An extensively redesigned line of mass produced, standardized "BCF" heat exchangers is announced by Ross Heater & Mfg. Co., Inc., Buffalo, N. Y. for Diesels, gas engines, compressors, hydraulic machinery, blowers and many other industrial applications.



Widely used in jacket water and lube oil cooling, it is claimed equally effective in heat recovery, vapor condensing and process heating applications.

P-125—Aluminum Treating Chemical Coat

A surface treating chemical for aluminum called "Alodine," developed by the American Chemical Paint Co., Ambler, Pa., produces a protective coating in as short a time as two minutes or less, the manufacturer states. This chemical can be applied by dipping, spraying in a power washer, or brushing.

Dipping parts into a tank containing the Alodine bath is said to require but two minutes; spraying the work in power spray washer equipment reduces this short time to about 20 seconds for an excellent coating, iridescent in color, to form, and when the "Alodine" chemicals are brushed on large surfaces, such as aircraft, tanks, etc., the coating time ranges from one to five minutes.

Under severe corrosive conditions, Alodized aluminum compares favorably in its ability to anchor paint and stop corrosion with the best surfaces produced in even the most complicated processes, it is claimed.

P-126—Multiple Drum Carrier

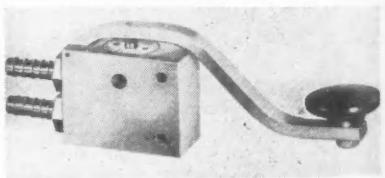
The Tray-Hart multiple drum carrier, designed to pick up, carry and tier two or four 55-gallon drums without the use of a pallet, is now listed among the special handling attachments for use on fork trucks manufactured by Clark Equipment Co., Battle Creek, Mich. The device fits over the top of the drums and is provided with clamping shoes actuated by hydraulic power taken from the hydraulic lift mechanism of the fork trucks. Weight of the drums serves to increase the tightness of the grip.

Tray-Hart multiple drum carrier

The carrier unit is easily interchangeable with standard forks; and installation requires only a few minutes with use of ordinary tools. The drum carrier is manufactured by Traynor-Reinhart, Oakland, Calif.

P-127—Three-Way Air Valve

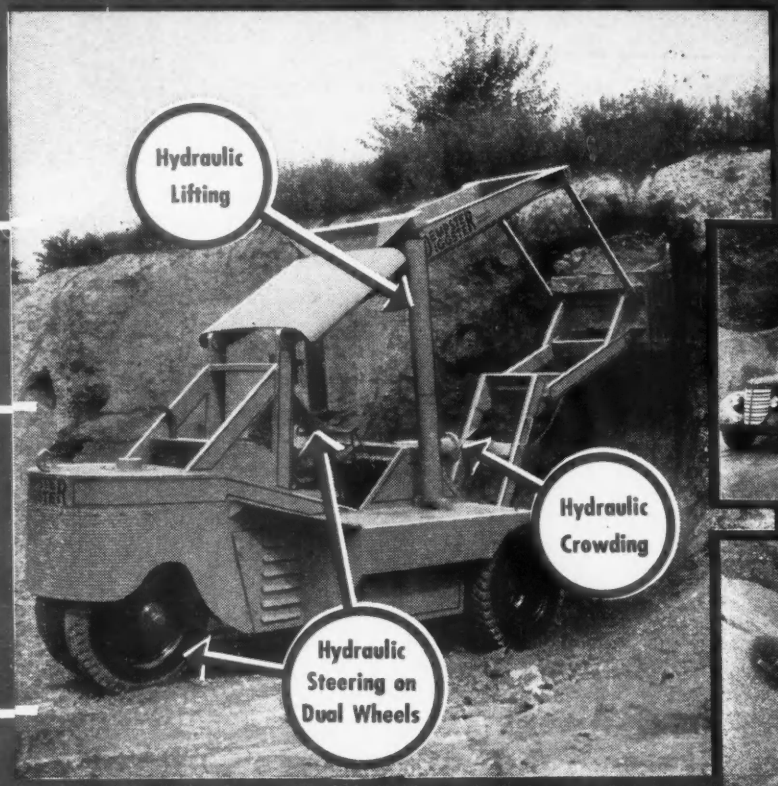
A new 3-way air valve, companion to the popular FT-1 series, has just been announced by Mead Specialties Co., Chicago, Ill. The new models are called FT-101 and FC-101 and have minimum openings of 5/16 in. throughout. The increased apertures make them quicker-acting with the larger air cylinders, yet they are said to retain the light touch and instant response of the smaller valves.



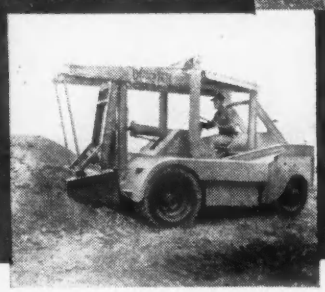
Mead poppet-type 3-way air valve in models FT-101 and FC-101

(*Turn to page* 56, *please*)

fast
mobile
easy to
operate



Dempster-Diggster



Has VICKERS HYDRAULIC CONTROLS

High speed versatility (as exemplified by the Dempster-Diggster) is characteristic of Vickers Hydraulic Controls.

Vickers Hydraulic Power Steering Booster makes it easier to steer the Dempster-Diggster over rough terrain, than a passenger car on smooth pavement. Steering load is carried by hydraulic cylinder . . . not by the driver.

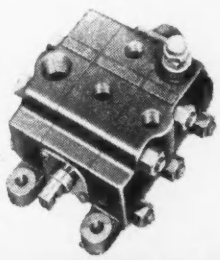
Vickers Balanced Vane Type Pumps supply oil under pressure also for actuating cylinders that lift and crowd the dipper. These pumps are exceptionally efficient and dependable; their exclusive hydraulic balance construction prolongs pump life by entirely eliminating pressure-induced loads and consequent wear.

Overload protection for the machine is provided by relief valves integral with Vickers Steering Booster and Valves. Write for descriptive bulletins.

Vickers Improved Hydraulic Steering Booster with integral overload relief valve. See Bulletin 47-30a.

Vickers Balanced Vane Type Pumps are engine driven. See Bulletin 36-12.

Vickers "Multiple Unit" Valves include relief valve for overload protection. See Bulletin 40-13.



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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

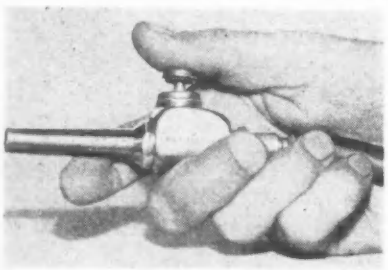
NEW ★ PRODUCTS

For additional information regarding any of these items, please use coupon on page 60.

Being of the poppet type, there are no sliding closures to wear out. They are fitted with hose nipples to take ⅜ in. I.D. and up to ¾ in. O.D. hose. Mounting holes at both top and sides of the rectangular valve body make them easy to attach to any machine for either cam for finger tip operation.

P-128—General-Purpose Air Hose Valve

New general-purpose air hose valve and nozzle put out by the Paul Valve Corp., New York, N. Y., has no springs, no packing, requires little thumb pressure to open, and instantly snaps tightly shut when an actuating plunger is



Paul air hose valve

released. The new valve is for any air line up to 100 lb per sq in. pressure. It produces a powerful air blast—effective as an air gun, and efficient as an ejector nozzle in automatic applications.

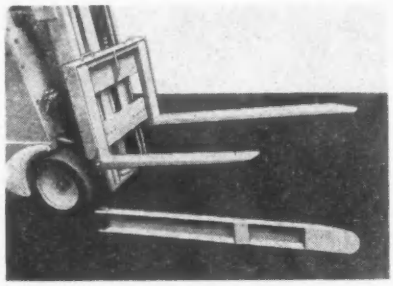
The Paul air valve eliminates springs by utilizing the well known Bernoulli Theorem which states that an object placed at the edge of a stream tends to move to the high-velocity, low-pressure center of that stream. The "object" in the Paul valve is a stainless steel ball which is forced by the Bernoulli effect into the high velocity air stream, thence into the seat.

The valve is opened by a thumb-actuated plunger that rolls the ball out of the seat and down out of the stream. When the plunger is released, the ball immediately pops back into the seat. Since the free ball rolls around a little between seatings, any wear is distributed evenly over its entire surface. Seal is the positive packless, O-ring type.

Of polished, high-chromium stainless steel in all working parts, the valve is available for ⅛ in. or ¼ in. hose sizes, both with bodies tapped for standard ¼ in. pipe threads.

P-129—Slip-On Fork Extensions

Lewis-Shepard Products, Inc., Watertown, Mass., has now made available a line of slip-on fork extensions for its



Lewis-Shepard slip-on fork extensions

"Standrive" power fork trucks which make it possible to handle loads of different lengths efficiently with the same fork truck.

Extensions, of welded steel, are available with tapered ends for handling rolls of paper; standard ends for picking up pallets; chisel ends for handling baggage, etc.

P-130—Brazed-On Tools, Kennametal-Tipped

Brazed-on tools for planing cast-iron on modern types of planers having a clapper box lift are now being supplied

by Kennametal, Inc., Latrobe, Pa. These tools have tips made of the new Kennametal Grade K1, and are available in two styles. Style 15PM is a square nose tool for finishing when feed per stroke is almost as great as the tool width, and Style 16PM ((illustrated) is a round nose tool for planing in a trough by plunging and feeding both ways.

Style 15PM is made in the following shank sizes—½ in. by 2 in., ¾ in. by 2 in., 1 in. by 2 in., 1 in. by 2½ in., 1 in. by 3 in. and 1½ in. by 3 in.

Style 16PM is made in sizes ¾ in. by 2 in., 1 in. by 2 in., 1½ in. by 2 in., 1½ in. by 2½ in.

PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Ford Motor Co.—Promotion of **Donald C. Burdette** to Parts Sales Manager, Detroit, has been announced.

Hudson Motor Car Co.—**W. J. Reuscher** has been appointed Comptroller of the company.

Plymouth Motor Corp.—**W. Louis Shuckman** has been made Service Manager of the Los Angeles plant.

Federal Motor Truck Co.—**H. L. Clark** has been promoted to Asst. General Sales Manager. He was formerly regional sales manager for the Central States.

Nash Motors Div., Nash-Kelvinator Corp. — The following appointments have been announced: **R. M. Hendrixson**, Parts and Accessories Manager, **W. A. Cook**, Service Manager.

Kaiser-Frazer Sales Corp.—The appointment of **John W. Merrin** to head a long range sales personnel program for the company has been announced.

Douglas Aircraft Co. — **Ralph V. Hunt**, Vice-President-Comptroller, has resigned. **Harry W. Strangman**, Asst. Treasurer, has been named Treasurer and elected to the dirctorship left vacant by Mr. Hunt.

Douglas Aircraft Co. — **Fred C. Fischer**, Director of Industrial Relations, has resigned to accept a position in New York City.

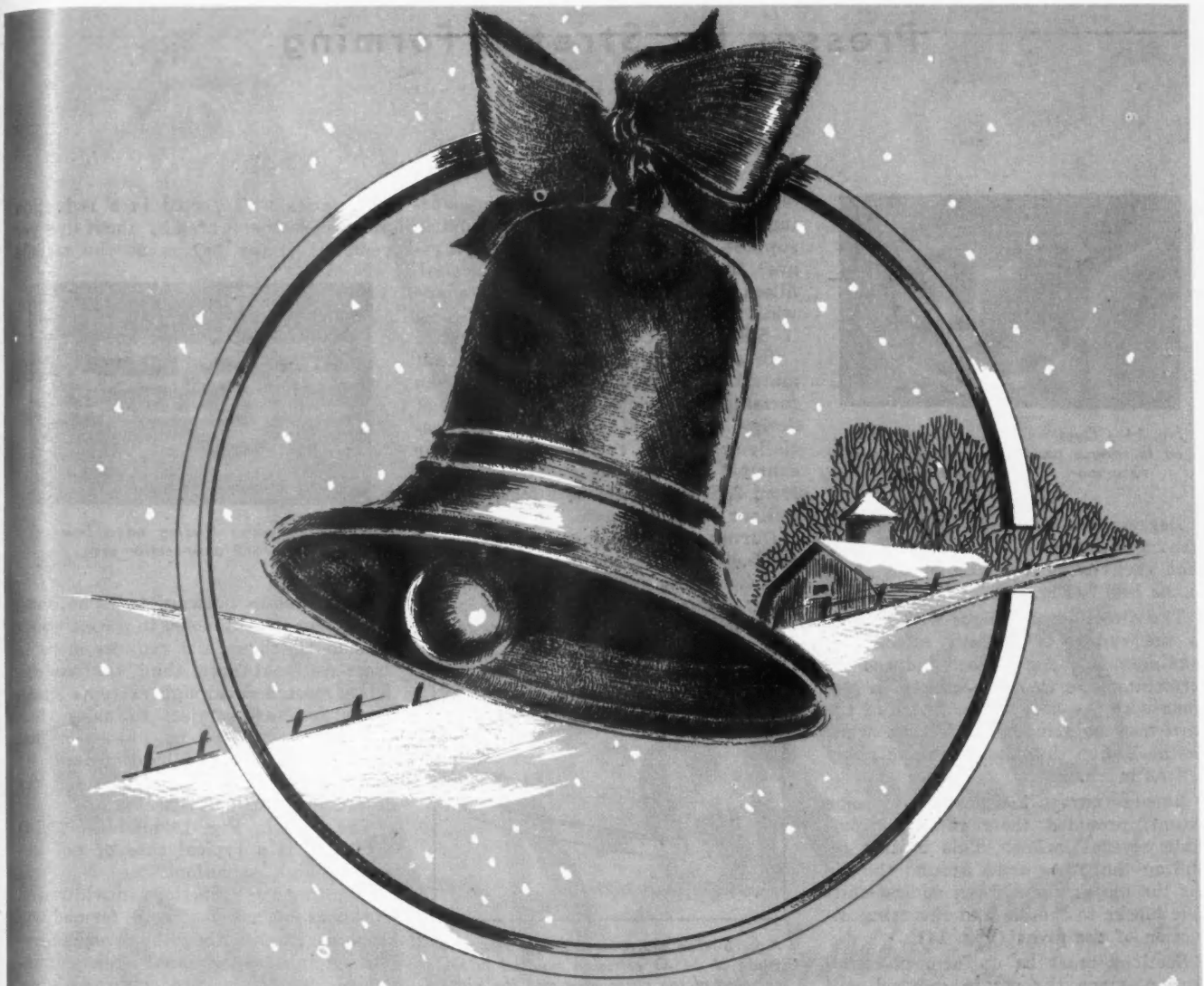
The Glenn L. Martin Co.—The resignation of **Matthew M. Gouger**, Vice-President, Personnel and Public Relations, and as a member of the Board of Directors, has been announced.

New Departure Div., General Motors Corp. — **Ralph O. Wirtemburg** has moved from the position of Eastern Regional Sales Manager to that of Special Assignments originating from the General Sales Manager's Office. **James P. Gillilan** succeeds Mr. Wirtemburg as Eastern Regional Manager.

Square D Co.—**L. G. Maechtlen** has been named General Sales Manager of the company's Western Div.

General Electric Co.—**W. W. Kuyper** has been appointed Divisions Engineer of the Turbine, Generator and Gear

(*Turn to page* 124, *please*)



Ring in the new with the right rings

There have been many new years since Sealed Power began business in 1911. During that time Sealed Power engineers have worked closely with engine builders to ring in many improvements. 1949 will be Sealed Power's 38th year of leadership. Sealed Power factories, laboratory equipment and staff are now at an all-time high. You are invited to use this organization to help make your good engines even better.

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SEALED POWER PISTON RINGS

PISTONS • CYLINDER SLEEVES

Presses for Stretch Forming

(*Continued from page* 40)

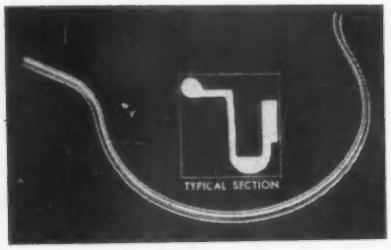

Fig. 14—"Question Mark" extrusion formed in reverse curve. Cerro-Bend is used to support section while forming.

Degreeing of extrusions while on the stretch die does not change the fact that such extrusions cannot be "bent to the heel" (Fig. 13).

The direction of flanges with respect to the radius of contour affects the maximum elongation induced by stretching due to notch effect. L sections with the heel on the inside of the turn may be stretched less than when the heel is on the outside, in fact, only 2/3 as much.

Reverse curves are possible to some extent, provided their radii approximate several inches. This is done by pulling the press arms around the die for the major curve, then adding suitable blocks to the die and reversing direction of the press (Fig. 14).

Sections must be uniform in cross-section, since the strain induced will concentrate at any necked-down area and pull the piece apart. An exception to this, due to its contour, is a rudder trailing edge bow (Fig. 17). This piece is formed from 24S-T clad sheet 0.032 in. thick. Due to the large number of pieces involved some time was

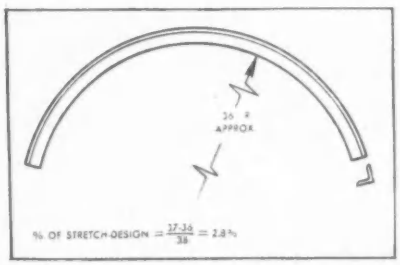

Fig. 15 — A 24S-O extrusion stretched over a contour of 36 in. radius.

expended to develop the die for springback. One end is much wider than the rest of the piece but no contouring of this area is done, therefore it is not necessary to exceed the yield strength there. To do so would exceed the ultimate strength of the adjacent section of smaller cross-sectional area.

Almost any cross-sectional shape may be pulled. It is preferred that the main legs lie in the plane of curvature during forming so that there is complete support of all legs by the die. However, in cases where this is impractical, fillers are used to support the shape while stretching. The shape in Fig. 14 if filled with Cerro-bend for support.

In stretch forming, the amount that material is actually elongated when forming by this method exceeds that of design by several per cent and especially where the radius is large. For example consider the part to be made from 24S-O extrusion stretched over a contour of 36 in. radius (Fig. 15).

During the forming operation the yield stress point is exceeded beyond that which is necessary to bend the piece to the desired contour in order to reduce springback. Adding this to

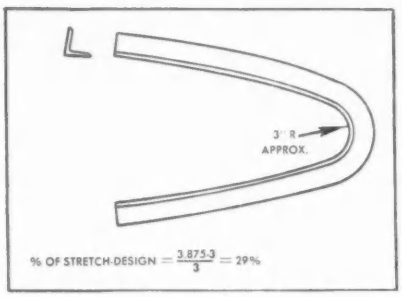

Fig. 16—The sharp curvature of this part made of 24S-O extrusion resulted in the thinning of the outer edge and the width of the outstanding leg by more than drawing tolerances.

the 2.8 per cent design calculation will result in a higher-than-design elongation.

The yield point amount is exceeded and varies as reflected in a reduction of cross-sectional area by about five per cent. Forming begins at the middle

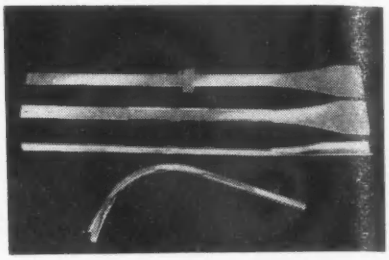

Fig. 17—Rudder trading edge bow of non-uniform cross-section area.

and progresses outwardly. The ends, therefore, are subjected to a continuous tension which usually reduces more in cross-sectional area than the middle. Parts stretched through extreme sharp curvatures are subject to more than average reduction in cross-sectional areas and this should be considered by the designer as to whether or not the design loads will be affected.

The part in Fig. 16 made of 24S-O extrusion is a typical case of not unusually high reduction.

Charting the reductions in width and thickness of many stretch formed extrusions reveals that the average reduction in cross-sectional areas of annealed materials are approximately five per cent whereas an extremely sharp curvature may reduce a section by 10 per cent or more. Also, materials stretched in the T condition are reduced more than those annealed, because of the relatively higher stretch needed to overcome springback.

Oldsmobile New Engine

(*Continued from page* 33)

generator from a separate pulley mounted on the fan hub. The fan and water pump drive is at 0.85 per cent of engine speed and this low ratio is said to be conducive to improved mechanical efficiency and low fan noise level.

Coming to the other engine accessories, the fuel pump is mounted on the right hand side at the front, the ignition distributor at the rear, and the coil at the top center just ahead of the distributor. An oil filter of full-flow type is used to protect the lubrication system, particularly the hydraulic valve lifter lines. It is mounted horizontally on the right hand side at the lower level of the crankcase. The lubrication system has a capacity of 6 qt, including the filter.

Reproductions of several principal cross-sections of the engine will give the reader a better visualization than any word picture of transverse and longitudinal section details, arrangement of cylinder assembly and crankshaft, combustion chamber design, arrangement of the lubrication and induction systems, etc.

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L-158—Wire Rope

Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.—The new Wickwire rope catalog offers a different approach to the subject of wire rope making. New charts, tables, drawings and photographs have been included to present a fresh slant on wire rope. The text has been written to appeal to the technical man and is also easily understandable to the layman. Three sections cover the following: the first, characteristics of wire rope; the second section has been divided into six parts, describing wire rope for specific industries; the third section deals with the care and handling of wire rope.

L-159—Cartridge Ball Bearing

Norma-Hoffman Bearings Corp.—A new booklet on its "Cartridge" ball bearings has been released by the company. It is illustrated, contains 28 pages and describes the many applications of this bearing; dimensional data, load rating, dirt protection, grease type, content and retention and the bearing's service record without relubrication.

L-160—Aircraft Actuators

Western Gear Works—A 36-page catalog, number 4811, illustrating many of the types of aircraft actuators designed and built by the company, has just been completed. It is designed for engineers in the aviation industry. Specific data is included covering rotary, linear and cable-drum actuators. Dimensional data, performance charts, and specifications are given for many of the various types.

L-161—Recorders and Controllers

The Brown Instrument Co., Div. Minneapolis-Honeywell Regulator Co. —Catalog No. 15-12 features pH and conductivity control and their application to different industrial processes. It also offers a discussion of the fundamentals of pH, oxidation-reduction potential and conductivity and describes various instruments such as the ElectroniK Potentiometer, Flow Electrode Assembly. The catalog contains photographs, schematic drawings, circular and strip charts and scales and dimensional diagrams of pH equipment.

L-162—Silicone Fluids

Dow Corning Corp.—A booklet just issued gives information on the properties and behavior of the DC200 Silicone Fluids. Chapters on chemical structure, applications, general properties are included, together with a physical properties chart; viscosity-temperature relation chart, etc.

L-163—Roller Bearings

The Tyson Bearing Corp.—A new 12-page, 2-color booklet, The Story of the Better Tapered Roller Bearing, describes in detail the company's "all rolls" bearing. Both friction and antifriction bearings are described. Another booklet, available from the company is one entitled Anti-Friction Bearing Maintenance which provides general information for the handling of bearings. Instructions cover the types of bearings most frequently used.

L-164—Lubricated Plug Valves

H. K. Porter Co., Inc.—A new lubricated plug valve catalog consists of 16 pages, fully illustrated and provided with dimensional drawings, tables and descriptive matter. A feature of the catalog is a full-page cross-section view of the valve which, with the accompanying explanation, gives a clear description of the valve's advantages. The tables contain dimensions and list prices, all pertinent data, such as size of lubricant stick, size of adaptor for pressure-gun lubrication, size of wrench and locking device, etc.

(Turn to page 62, please)

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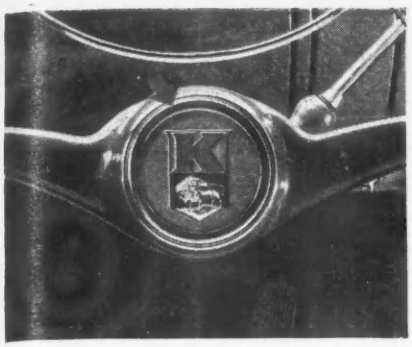
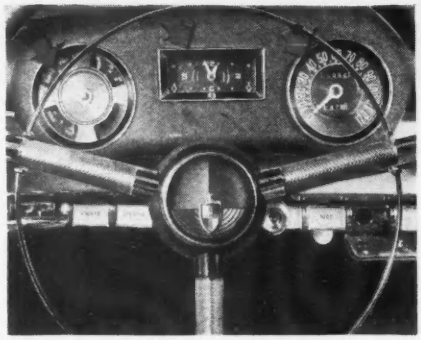
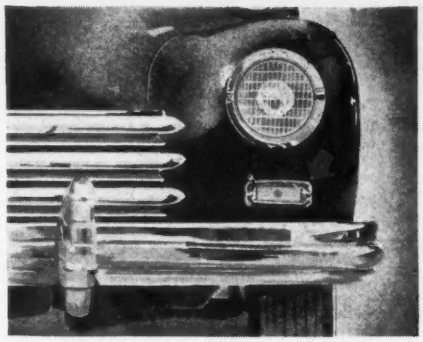


Horn button of sparkling "Lucite" in beautiful three-dimensional colors. Horn buttons of "Lucite" are used on 15 makes of cars. (Horn button molded by Kent Plastics Corp., Evansville, Ind.)



Instrument dials of crystal-clear "Lucite." Luxurious styling in practical use. Highly visible, highly durable. Dials of "Lucite" are used on 11 makes of cars. (Dials molded by Cruver Mfg. Co., Chicago.)



Headlamp and parking lamp lenses of "Lucite." Transmits up to 92% of light, resists shattering, cracking, crazing. An interesting MICRO-STYLING possibility for weather-resistant "Lucite."

Right in line with Smart design

MICRO*STYLING with "LUCITE"

The time-tested plastic (since 1937)—
Now in 99 parts on 17 makes of cars

***MICRO-STYLING** is the design of small but important automobile accessories for beauty and utility. A handsome hood ornament . . . a sparkling tail-light lens . . . a door handle with the luxury look and feel . . . a host of little things will impress the customer. MICRO-STYLING can help sell and *re-sell* your cars to buyers who are becoming more and more style-conscious. Your MICRO-STYLING calls for the best in quality materials . . . Du Pont "Lucite."

THESE advantages make "Lucite" acrylic resin your wisest investment for MICRO-STYLING.

LONG-LASTING COLOR—"Lucite" comes in a wide range of color-fast hues, transparent, translucent and opaque. Proved in use since 1937, "Lucite" holds its beauty through years of weathering and hard service.

SPARKLING TRANSPARENCY—Smartly designed lenses, dial faces, etc., of crystal-clear "Lucite" transmit up to 92% of light. "Lucite" can be "edge-lighted," and will "pipe" light around curves.

LUXURIOUS SMOOTHNESS—You'll notice right away the smooth, warm look and feel of knobs and handles made of "Lucite." It withstands hard knocks . . . it's not brittle.

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Publications Available

(*Continued from page* 60)

L-165—Rivets

Vic-Pastushin Industries, Inc.—An illustrated 8-page folder in color has been issued on the use of Fluid-Tight Jacketed Rivets and Head-Sealing Washered Rivets in sealed structural assemblies of aircraft.

L-166—Alloy Steel

Joseph T. Ryerson & Son, Inc.—A new bulletin giving analysis and mechanical properties of a new free machining alloy steel, Rycut, is available.

L-167—Roller Chain

Atlas Chain & Manufacturing Co.—A new, 8-page catalog lists prices and specifications for single and multiple chains ranging in size from #25 to #200. Prices and sepcifications for lug-type attachments covering this range are also included. Several improvements in design and production of Atlas Roller Chain have been added and these are discussed in the catalog by means of engineering drawings and photomicrographs.

L-168—Lathes

South Bend Lathe Works—Catalog No. 73 describes, illustrates and gives prices for the new 13 and 14½ inch swing South Bend Precision Lathes, equipped with 1-inch maximum collet capacity headstock spindles. Also listed are chucks, collets, and other accessories for use with these new larger spindles.

L-169—Heat-Treatment of Steel

Leeds & Northrup Co.—Catalog TB2-621, Vapocarb-Hump, The Triple-Control Method for Heat-Treatment of Steel, describes furnace equipment for hardening steel precisely, and also to carburize and gas cyanide small loads. It describes the triple-control method which regulates atmosphere, rate of heating, and quench point to provide hardened steel of proper surface, shape and structure. Accessories are described and numerous illustrations show typical Vapocarb-Hump furnace installations, actual heat-treating procedures and diverse steel and product types being treated by users of these furnaces.

L-170—Punching Units

Progressive Welder Co.—A 4-page bulletin describes the company's line of compact hydraulic punching units with cylinders inter-changeable on different types of bases. Drawings and text clearly explain important points of design and operation and a table of comparative pressures gives punching force attainable for each size unit at various hydraulic pressures up to maximum.

L-171—Thermocouples

Wheelco Instruments Co.—A complete new Thermocouple Manual has been made available. The 40-page illustrated manual provides information on selection of proper thermocouples and protecting tubes, methods of checking thermocouples and pyrometers and installation data. It also describes and lists current prices on thermocouples, lead wire, heads, connectors, etc.

L-172—Production Management

Albert Ramond and Associates, Inc.—Production Management is the title of a new booklet which reviews some of the major current questions relating to production, wages, costs, quality and labor relations. It presents answers which actual experience has proven to be effective, workable and lasting.

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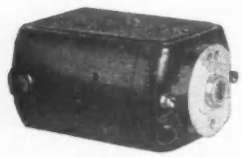
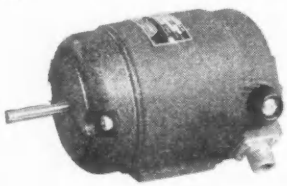


A compact motor, particularly suitable for computing machines and other types of motor-driven office equipment.



This small sturdy motor can be readily adapted to a wide range of industrial application.

● Special engineering to provide the exact electrical and mechanical characteristics ... precision manufacturing ... rigid testing — these comprise the craftsmanship that assures superior performance and dependability in Lamb Electric Motors.

Because of this high standard of performance, Lamb Electric Motors are powering more and more of America's finest products.

THE LAMB ELECTRIC COMPANY
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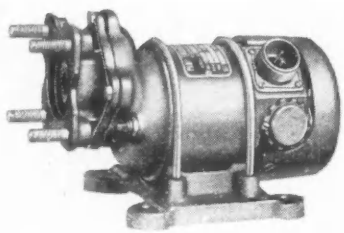
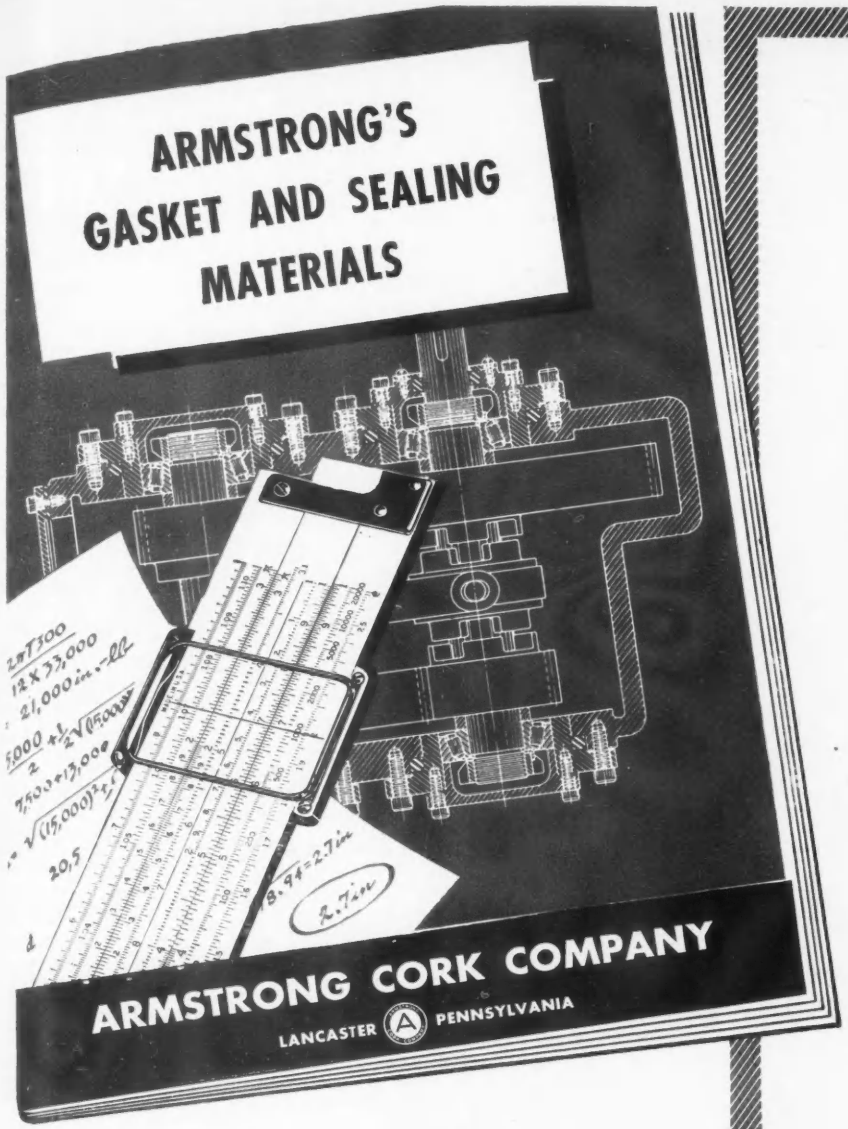


Base-mounted, explosion-proof aircraft geared fuel transfer pump motor.

Lamb Electric SPECIAL APPLICATION FRACTIONAL HORSEPOWER **MOTORS**



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If you design, specify, or buy gaskets, you'll find this 24-page gasket guide helpful. "Armstrong's Gasket and Sealing Materials" shows typical applications. It suggests methods of putting Armstrong's stock materials to specialized uses in such fields as the radio, electrical, automotive, petroleum, and transportation industries. It also includes government specifications—plus up-to-date charts on synthetic rubber, cork-and-synthetic-rubber, cork composition, and fiber sheet sealing materials. For your free copy, fill in coupon and mail today.

Table of Contents

- Cork Compositions
- Cork Specialties
- Cork-and-Synthetic-Rubber Compositions
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- Synthetic Rubber Compounds
- Stock Materials That Do Specialized Jobs
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- Effect of Surface Condition on Gaskets
- Factors in Choosing Resilient Gaskets
- Proper Compression for Resilient Gaskets
- Relation of Gasket Thickness to Load
- Resistance to Chemicals
- Sealing Oils with Synthetic Rubber
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British "Big Six" Combine

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LONDON

Without waiting for the Austin-Morris combine to take effect, Minister of Supply Strauss has announced that the British Big Six—Austin, Ford, Nuffield, Rootes, Standard and Vauxhall—will immediately combine to use common accessories and components and secure a higher degree of standardization in the industry. The Big Six control 90 per cent of the British industry, having produced 229,057 automobiles out of a total of 254,508 during the first nine months of this year.

This scheme is a part of the program for greater output and more exports and covers not only automobiles but the full field of general engineering. On Sept. 16, engineering trade associations met and discussed schemes for mutual aid, embracing the exchange of technical advice and of technicians. Said Minister of Supply Strauss, "We want to close the gap between the more efficient and the less efficient members of the engineering industry. The trade associations decided to set up production committees for exchange of information and advice to members. Inter-factory visits are being arranged."

The Government plan has the backing of the Society of Motor Manufacturers and Traders. Regular meetings, possibly monthly, are to be held by executives of the Big Six, when blue prints, operation sheets, and details of jigs and tools will be laid on the table. First steps will include more standardization of equipment and components, comprising batteries, electrical equipment, carburetors, and other units. There is no intention of standardizing design, but when a new model gets into production it will be open to inspection by all other firms. If a gas turbine automobile is produced, its details would be shown to all other manufacturers declares Sir Reginald Rootes, vice-president of the S.M.M.T.

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CALENDAR

Conventions and Meetings

Nat'l. Assoc. of Eng. & Boat Mfg., Motor Boat Show, New York City .....Jan. 7-15
SAE Annual Mtg., Detroit .....Jan. 10-14
Nat'l. Materials Handling Expos., Phila. .....Jan. 10-14
Amer. Trucking Assoc. Annual Convention, Edgewater Park, Miss. .....Jan. 17-19
Nat'l. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco .....Jan. 24-27
Nat'l. Council of Private Motor Truck Drivers, Indianapolis .....Jan. 27-28
Automotive Access. Mfrs. Annual Expos., New York City .....Feb. 7-11
Amer. Soc. for Testing Materials Annual Spring Mtg., Chicago Feb. 28-Mar. 4
Amer. Soc. of Training Directors, Cleveland .....Mar. 3-5
SAE Passenger Car, Body, Prod. Mfg., Detroit .....Mar. 8-10
Chicago Technical Soc. Council, Annual Production Show, Chicago .....Mar. 14-17
SAE Transportation Mtg., Cleveland .....Mar. 28-30
SAE Aeronautic Mtg., New York City .....April 11-13
Amer. Soc. for Metals, Western Metal Congress, Los Angeles .....April 11-16
Midwest Power Conference, Annual Meeting, Chicago .....Apr. 18-20..
Salon International DeL' Aeronautique, Paris .....April 29-May 15
Chamber of Commerce of the United States Annual Mtg., Washington May 2-5
Amer. Management Assoc. Nat'l. Packaging Exp., Atlantic City May 10-13
Middle Atlantic Regional Automotive Show, Phila. .....May 23-30
SAE Summer Mtg. French Lick..June 5-10
Amer. Soc. for Testing Materials Annual Mtg., Atlantic City..June 27-July 1
Amer. Electroplater's Soc. Annual Convention, Milwaukee .....June 27-30
SAE West Coast Mtg., Portland, Ore. Aug. 17-19
Instrument Soc. of America Convention, St. Louis .....Sept. 12-16

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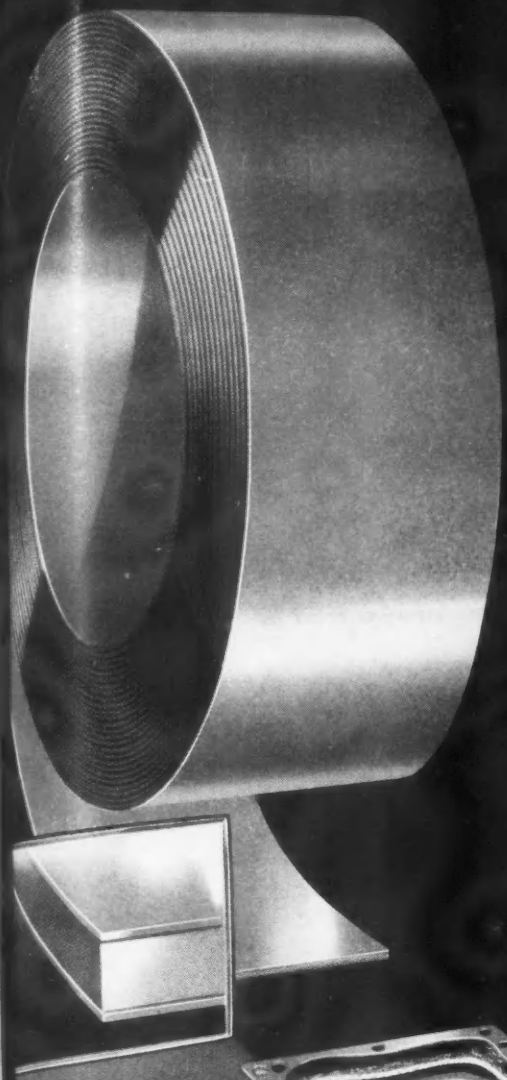

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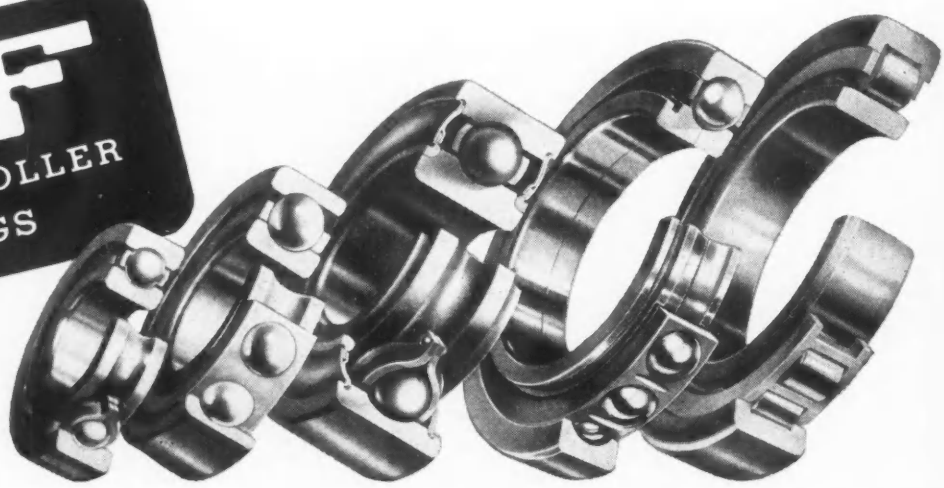

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Business activity, in general, during the last full week in November registered a moderate decline. Department store sales, electric power production, crude oil output, bituminous coal production and railway freight loadings were lower than in the preceding week but in some cases exceeded the levels in 1947. The volume of construction during the seven days ended Dec. 2, however, advanced widely as a result of a sharp increase in private building. The *New York Times* index of activity for the week ended Nov. 20 stands at 156.8, as compared with 153.3 in the preceding week and 152.9 a year ago.

Sales of department stores during the week ended Nov. 27, as reported by the Federal Reserve Board, equaled 347 per cent of the 1935-39 average, as compared with 371 in the week before. Sales were five per cent below the corresponding distribution a year earlier, marking the fourth consecutive week of sales below the 1947 level.

Electric power production declined contraseasonally in the week ended Nov. 27. The output was 7.8 per cent above the corresponding amount in 1947, as compared with a similar advance of 8.6 per cent shown for the preceding week.

Railway freight loadings during the same period, reflecting the embargo on shipments to strikebound ports on the East Coast, were 15.7 per cent less than the figure for the week before and 8.7 per cent below the corresponding number recorded in 1947.

Crude oil production in the week ended Nov. 27 averaged 5,617,050 bbl daily, 42,100 bbl less than in the preceding week but 359,800 bbl above the comparable output in 1947.

Production of bituminous coal and lignite during the week ended Nov. 27 is estimated at 9,990,000 net tons, 19 per cent less than the output in the week before. The total production in 1948 so far reported is 5.9 per cent below 1947.

Civil engineering construction volume reported for the week ended Dec. 2, according to *Engineering News-Record,* was $362,329,000, a peace time record, 348 per cent more than the preceding weekly figure and 69 per cent above the comparable sum in 1947. Private construction, nearly four-fifths of the total, was 783 per cent greater than in the preceding week. The total recorded for 49 weeks of this year was 25 per cent more than the corresponding amount in 1947.

The wholesale price index of the Bureau of Labor Statistics for the week ended Nov. 23, at 164.9 per cent of the 1926 average, was 0.4 per cent higher than in the preceding week and 3.2 per cent more than the corresponding figure in 1947.

Member bank reserve balances declined $57 million during the week ended Dec. 1. Underlying changes thus reflected include decreases of $158 million in Reserve bank credit and $123 million in Treasury deposits with Federal Reserve Banks, accompanied by increases of $20 million in money in circulation and $21 million in Treasury cash.

Total loans and investments of reporting member banks decreased $185 million during the week ended Nov. 24. A decrease of $23 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, $15,545 million, shows a net increase of $1199 million in 12 months.

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Economic Chaos

(*Continued from page* 25)

Validity of Pricing Practices

The validity of any pricing practice must be measured by the provisions of the Sherman Anti-Trust Act, the Federal Trade Commission Act, and the Robinson-Patman amendment to the Clayton Act.

The Sherman Act outlaws all conspiracies in restraint of trade. This includes all price fixing conspiracies. It includes conspiracies to fix prices through the use of f.o.b. mill selling. To the extent that the Commission's activities in the pricing field are confined to conspiracy cases, it required none of the other legislation previously referred to, for price fixing conspiracies have been illegal since the Sherman Act was passed in 1890.

The Trade Commission Act authorizes the Commission to outlaw unfair methods of competition. The statute does not define that phrase and neither the Court nor the Commission has ever done so. In a statement of policy issued by the Commission on Oct. 12, 1948, it advises that *knowing parallel conduct* is an unfair method of competition and illegal. The Commission concludes that identical prices are collusive and illegal regardless of whether they result from conspiracy or from competition. The Commission views similar prices resulting from competition as creating an economic result undistinguishable from similar prices resulting from conspiracy. But most businessmen deny that those practices are each equally iniquitous.

You will probably find that in any city many brands of chewing gum, cigarettes, gasoline, newspapers and many other similar products are sold at the same price. That similar pricing pattern may well result from the fact that the sellers assembled in a smoke filled hotel room and agreed to fix prices. But it may also result from the fact that the forces of competition do not permit one seller to charge more for his product than is charged by other sellers for similar products. The Commission, however, views all "knowing parallelism" in pricing practices as unfair methods of competition and illegal, without respect to whether the parallelism results from conspiracy or competition.

Under this statute the Commission says it may be legal for one seller to use a basing point system, or freight absorption practice, but that such practice becomes illegal if it is subsequently followed by his competitors.

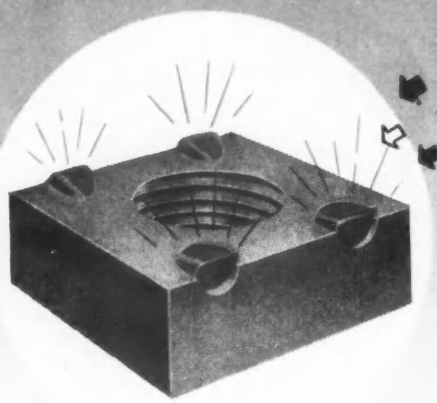
If a newcomer to the business world were to adopt a new, novel, and unheard of pricing policy, which violated no requirement of the law, it would nevertheless become illegal for him to use that pricing practice if a substantial number of his competitors determined that competition required them to follow the same pricing practice and they in fact did so. And it would not only be illegal for those who subsequently adopted the practice, but it would also become illegal for the originator of the practice.

It has been argued that a manufacturer cannot sell in distant markets without maintaining a sales force in those distant markets, and that a sales force cannot be maintained without authorizing salesmen to systematically quote prices which are competitive. But the Commission views salesmen as economic bootleggers. Many economists feel there is no economic justification for a salesman. Even if Gracie Allen can sell Maxwell House coffee without the aid of salesmen, the small newcomer to the grocery industry cannot market an unknown brand of French dressing without salesmen.

The third statute by which the legality of any pricing practice must be measured is the Robinson-Patman Amendment to the Clayton Act. The key to an understanding of this Act is the Commission's philosophy that price, as used in the Robinson-Patman Act, means the seller's mill net return. It

(*Turn to page* 70, *please*)

ANNOUNCING!



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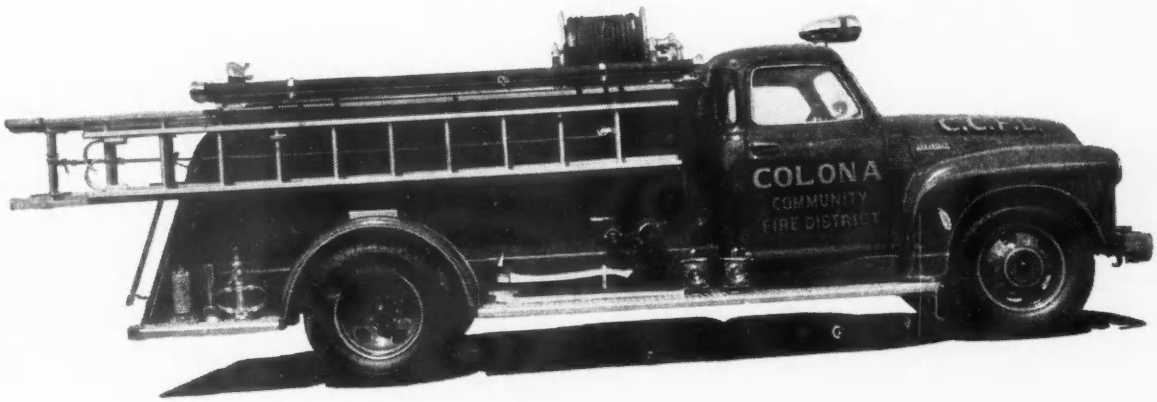
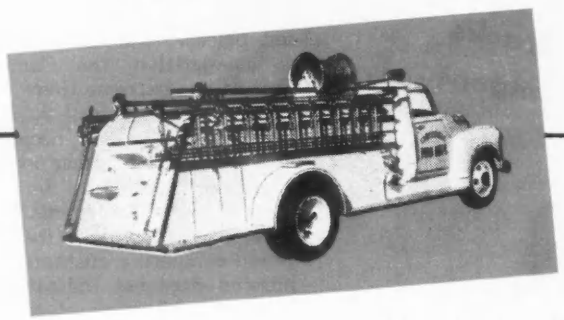
"INCREASED EFFICIENCY...DECREASED COSTS WITH N-A-X HIGH-TENSILE STEEL"

Fire Fighter Truck Company, Rock Island, Illinois





Here is what the Fire Fighter Truck Company of Rock Island, Illinois has to say about N-A-X HIGH-TENSILE steel.

"In the use of this steel, we have increased the efficiency of our fire trucks and at the same time decreased our construction costs. We are now permitted to increase the hose carrying capacity using the same gauges as we formerly did with plain hot rolled sheet steel.

"The added strength of N-A-X HIGH-TENSILE permits us to install booster tanks of larger gallonage. The corrosion-resistant properties of the steel has shown to good advantage in that longer life is noted in our booster tank.

"We have found that in applying paint to this steel we can secure a better and longer lasting bond due to its impact- and abrasion-resistant qualities. These same qualities reduce shop imperfections from abrasion and impact, thus reducing surface refinishing prior to painting."

The high physical properties of N-A-X HIGH-TENSILE steel can help *you* increase your production . . . improve your product . . . reduce your fabricating costs.

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Specify—
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is the Commission's view that a seller who sells the same product at the same delivered price to two customers who are located at unequal distances from his plant, receives discriminatory varying mill net returns. A seller who sells at the same delivered price to customers in a thousand different towns to which there are a thousand different freight rates has a thousand different mill net returns. These varying mill net returns also result whenever a seller absorbs freight on a sale to a distant customer in order to compete with a competitor whose plant is located closer to the customer. Such varying mill net returns are all discriminatory and they are illegal whenever they may injure competition.

In the Morton Salt case, the Supreme court held that an order of the Commission would be sustained if the Commission found a reasonable possibility of injury to competition.

The Commission's complaint against the cement industry charged a conspiracy to fix prices through the use of the basing point system. Its order found such a conspiracy. But when the case reached the Supreme Court, the Commission injected the mill net theory into the case. It then argued that the cement companies' pricing policies resulted in illegal price discriminations irrespective of conspiracy or agreement. And its spokesman expressly conceded that a nondiscriminatory pricing practice in that industry required uniform f.o.b. mill prices.

The Commission has long contended that a buyer close to the seller's plant has an inherent economic right to purchase at lower prices than more distant competitors, because of his advantage of location. But what about the seller's advantage of location? Is he to be denied the right to exploit his own advantage of location as to some of his customers and to try to offset his disadvantage of location as to other customers?

FTC Policy on Pricing Systems

The Commission's Oct. 12, 1948 statement of policy concludes that virtually all pricing systems, other than f.o.b. mill, are discriminatory and that they are illegal whenever those discriminations may be found to injure competition. But the Commission expressly avoids giving any yardstick by which the legality of any pricing system may be determined. Its philosophy is that the Commission must be free to judge the legality of each case, on the individual facts in that case, after litigation before the Commission.

That statement of policy concedes that the legality of pricing systems is crucially affected by the idea of what constitutes injury to competition through discriminatory varying mill net prices. But as to what is injury to competition, the Commission says that at one extreme there would appear to be no injury until substantial numbers of people had become bankrupt, and that, at the other extreme, injury to competition might be found in any case in which there was a price difference, no matter how insignificant, between competing customers. The Commission does not indicate at which of those extremes or at what point between them it will fix the existence of injury to competition.

Thus at a maximum, f.o.b. mill selling is required in virtually every American industry, and at a minimum a seller can never know in advance of litigation with the Commission whether any pricing practice, other than f.o.b. mill selling, is legal. It thus seems clear that any seller, in an industry where freight is a substantial part of the delivered cost, can only sell with assurance that his pricing system is legal if he employs a uniform f.o.b. mill price.

At the public hearings of the Senate Trade Policies Committee, three of the principal attorneys for the Federal Trade Commission have confirmed that conclusion and have testified that the only safe and certain way of selling commodities with assurance that the pricing practice employed is legal, is to sell at f.o.b. mill prices.

When this country was founded, more than 150 years ago, most products were sold on an f.o.b. factory

(*Turn to page 72, please*)

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THE **DOLE "DV" LINE**

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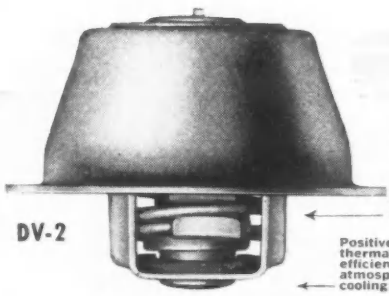
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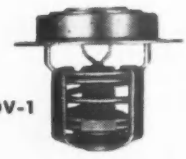
Powerful spring to control high pump pressure.
Positive-acting, accurate thermal element for most efficient performance in atmospheric and sealed cooling systems.

DV-2

• These new-type units efficiently handle the extra loads placed on thermostats by increased water velocity which gives improved cooling in modern engines. They are not affected by pressure differentials. In sealed cooling systems, a "DV" Thermostat makes it possible to obtain adequate cooling with a high-set pressure cap and a smaller radiator.

Dole "DV" Thermostats are powered by a new type of element proved in use for many years in other thermostatically-controlled products. Their accurate control and *longer life* meet every need of the modern car. Higher heat thermostats for sealed cooling systems are an exclusive Dole feature—as is complete absence of "tapering" in valve seating pressure.



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New "DV" Thermostats are a "companion line" to the now-famous Dole Bi-Metal Thermostats of which millions are serving satisfied customers as original equipment and replacement units.

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- **Not affected by pressure caps in sealed systems.**
- **Positive-acting thermal unit assures accurate control.**
- **Full seating pressure minimizes "leakage".**
- **Actuated by "solid expansion"— not vapor pressure.**
- **Rugged construction means longer life.**

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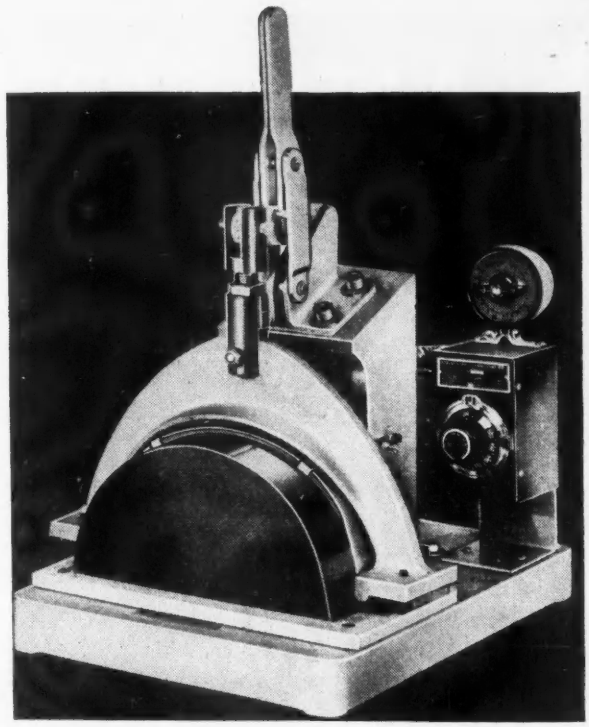
HOW MONEL HELPS LINE A BRAKE—

...without rivets



Brake band rivets have been with us since automobiles first had brakes...

But now, using the war-developed Cycleweld process, the Hot Shot brake reliner bonds band to shoe with a tough, thermo-setting plastic cement. Leading car manufacturers...Chrysler Corporation, for instance...have already abandoned rivets in favor of this new, simpler process.

But before the Spanich Manufacturing Company had their Hot Shot machines ready for market, there was a serious design problem to be solved. According to Spanich, the flexible band that applies pressure to the brake lining during Cycle-welding couldn't take the required 525° F. heat. It stretched; made constant adjustment necessary.

Bands made of MONEL* were substituted . . . and the problem was solved! After six months of testing, Spanich engineers found that the MONEL bands did not stretch in service, and lasted several times as long as those of the original metal.

This is but one of countless ways the family of INCO Nickel Alloys is serving industry . . . improving product usefulness, reducing maintenance costs. Next time you are faced with a problem that demands a "task metal". . . one that will withstand corrosion, high temperature, abrasion, vibration . . . one that is hard, tough, stronger than structural steel, yet machinable . . . remember the INCO Nickel Alloys.

For your reference files, ask for Technical Bulletin T-5, *"Engineering Properties of Monel."*

*Reg. U. S. Pat. Off.

For further information about Hot Shot Brake Reliners, write to: Spanich Manufacturing Company, 3406 Guardian Building, Detroit 26, Michigan.

•

MONEL

EMBLEM OF SERVICE

INCO

TRADE MARK

MONEL...FOR MINIMUM MAINTENANCE

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

A NEW ORDER OF DURABILITY IN METALS

Alodized

ALUMINUM

(Coated with "Alodine"®)

ANCHORS THE FINISH
RETARDS CORROSION

NO ELECTRIC CURRENT

NO SPECIAL SKILLS

NO HIGH TEMPERATURES

SHORT PROCESSING TIME

Economical for either small or large plant operation, interrupted or continuous production. Write or call for descriptive folder on "Alodine".

Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY

AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

basis. This was necessarily so because the limited transportation facilities of the day required that commerce be largely confined to local markets. But as the transportation, communication and financial systems of the nation grew, uniform delivered prices, zone pricing and freight absorption came into being. Many companies achieved national distribution of their products.

Billions of dollars of the money of American people have been invested in industrial facilities and railroad properties in the belief that uniform delivered prices and freight equalization were both morally and legally proper. Many of these investments may be impaired by a pricing philosophy which requires only f.o.b. mill selling. The owners of those investments complain that it is not fair to change the rules during the middle of the game.

The steel industry originally grew up in Pittsburgh because of the availability of iron ore, coal and power. The cement industry originally grew up in the Lehigh Valley because it was long felt that only rock in that area was suitable for the production of cement. The steel and cement industries have, of course, grown throughout the country, and Pittsburgh is now a substantial surplus steel producing area, while the Lehigh Valley is a substantial surplus cement producing area.

Steel mills and cement plants in those areas say that they cannot continue to stay in business, in normal times, unless they are able to ship their surplus production to distant areas, and that this cannot be done without freight absorption which now appears to be prohibited.

The Pittsburgh Chamber of Commerce is now actively engaged in encouraging industry to move to Pittsburgh. The erection of plants for steel users adjacent to the steel mills, seems to be inconsistent with the plant dispersal activities of our National Defense Program.

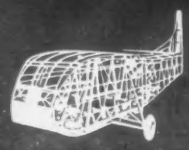
Dealer Competition Jeopardized

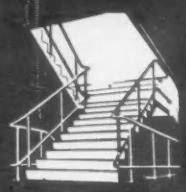
It has been urged that f.o.b. mill pricing may eliminate dealer competition in many commodities. For example, it is said that the cement dealer in a given community who purchases his cement from the closest mill will be able to buy at a lower price and thus have a substantial competitive advantage over other cement dealers in the same town. This may ultimately eliminate competition at the dealer level in commodities such as cement. This is particularly so when the nearby cement mill does not care to have more than one dealer in the town.

Fifteen per cent of the sugar consumed in the United States is beet sugar grown in the Rocky Mountain area. Yet only three per cent of the population lives in that area. These beet sugar growers say they must, therefore, ship their beet sugar to distant markets; but when it is shipped

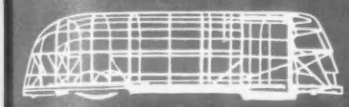
(*Turn to page 74, please*)

Michigan WELDED STEEL TUBING





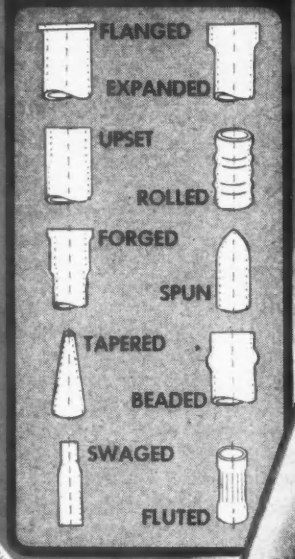
The Modern Electric Resistance Welded Steel Tubing

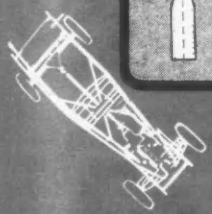


ROUND — ⅛" To 4" O. D. 9 To 22 gauge

SQUARE RECTANGULAR — ½" To 2" 20 gauge—1" To 2¾" 14, 16, 18 gauge

Can be **BENT** *also . . .*





Men of Vision

have made America the greatest industrial country the world has ever known. And its continued leadership depends upon the progress these men make in finding new methods for greater production of better products at lower cost.

Because of its fabricability, ductility, ease of assembly and installation, and for many other reasons, the metal working industry is constantly finding new uses for **MICHIGAN WELDED STEEL TUBING**. Whether you form and machine the parts in your plant or order them prefabricated by Michigan, you will find this tubing exceptionally uniform in structure and adapted to reworking by any production process.

Engineering advice and technical help in the selection of tubing best suited to your needs. Address your inquiries to:

Michigan STEEL TUBE PRODUCTS CO.

More Than 30 Years in the Business

9450 BUFFALO STREET • DETROIT 12, MICHIGAN

FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—Drummond, McCall & Co., Ltd., Toronto, Canada.

East, it competes with Cuban cane sugar; and when it is shipped West, it competes with Hawaiian cane sugar. The beet sugar growers say they cannot sell the normal production of their product without absorbing freight and receiving varying mill net returns.

The manufacturer of any product made from minerals or farm produce acquires a substantial inbound freight advantage if he locates his plant close to the source of his raw materials. Those raw materials, however, are found only where Nature placed them, and generally man has not chosen for the site of his large consuming areas the same sites chosen by Nature for her deposits of natural resources.

Thus the manufacturer with an inbound freight advantage, because of his proximity to the source of his raw materials, automatically acquires an outbound freight disadvantage in shipping his finished products to the consuming areas where his customers are located. And the manufacturer who locates his plant in the consuming area, in order to acquire an outbound freight advantage, automatically acquires an inbound freight disadvantage.

It has never been questioned but that a manufacturer may absorb inbound freight costs. We must now determine whether the manufacturer with an inbound freight advantage may not be permitted to absorb outbound freight in order to compete with competitors located closer to the customers.

Warehousing and Trucking Examples

On Nov. 18, 1948, the Senior Associate General Counsel for the Commission, who tried all these cases in the courts, gave illuminating testimony with respect to warehousing and trucking practices. He testified that a manufacturer who had a chain of warehouses throughout the country in local markets, could ship his products to those warehouses and absorb the full cost of transportation on such shipments. He further testified that these products or commodities could then be sold out of the warehouses at local prices which did not include the freight to the local market.

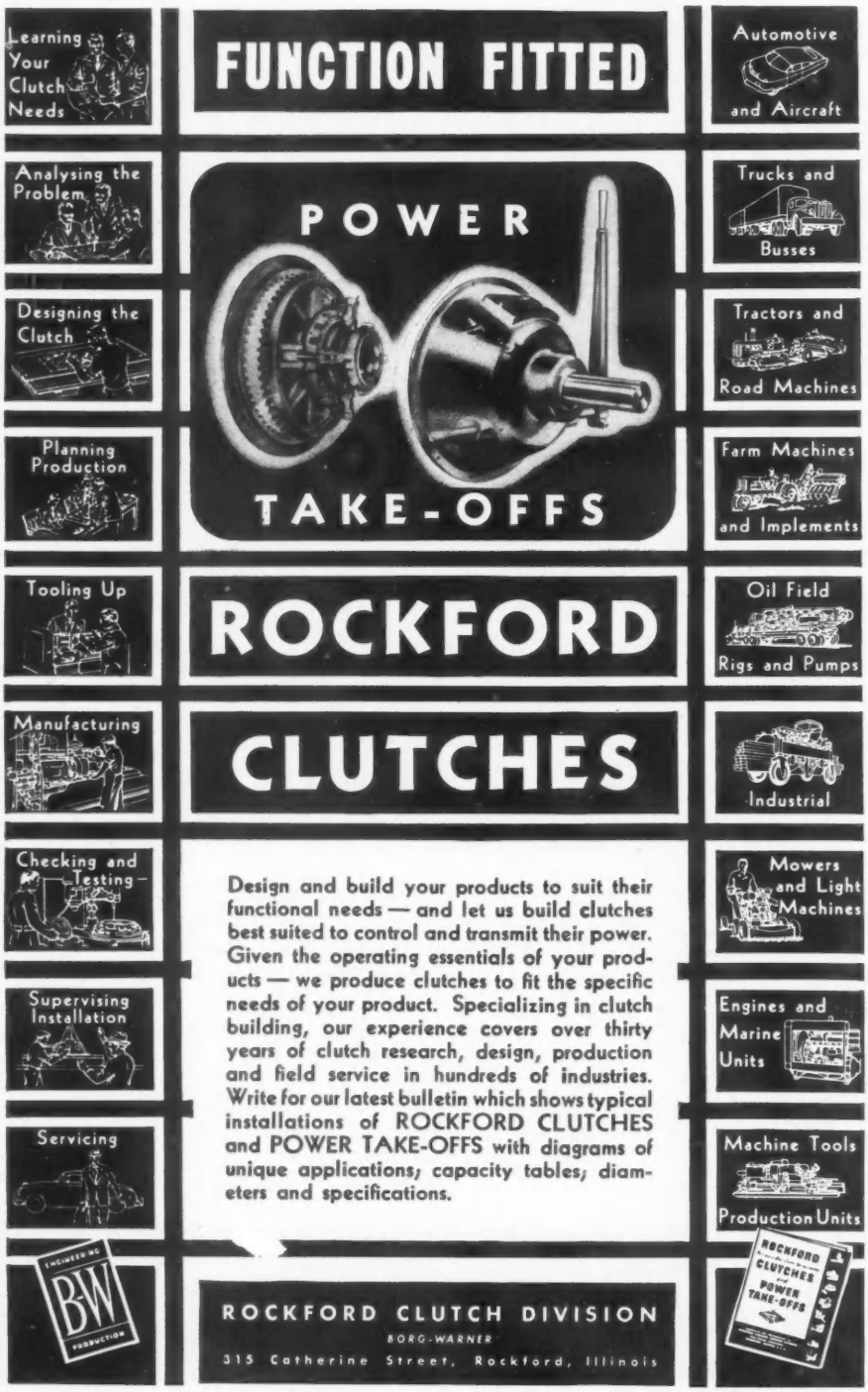
And in answering a hypothetical question, he testified that a competitor of that seller, located across the street from his plant, who did not have such a chain of warehouses, could not sell his products in those distant local markets without charging the full freight to the local market, and that he could not regularly and customarily meet the local prices of the chain warehouses operator. Thus the ability to compete on a national basis may well depend on the seller's financial ability to build a chain of warehouses.

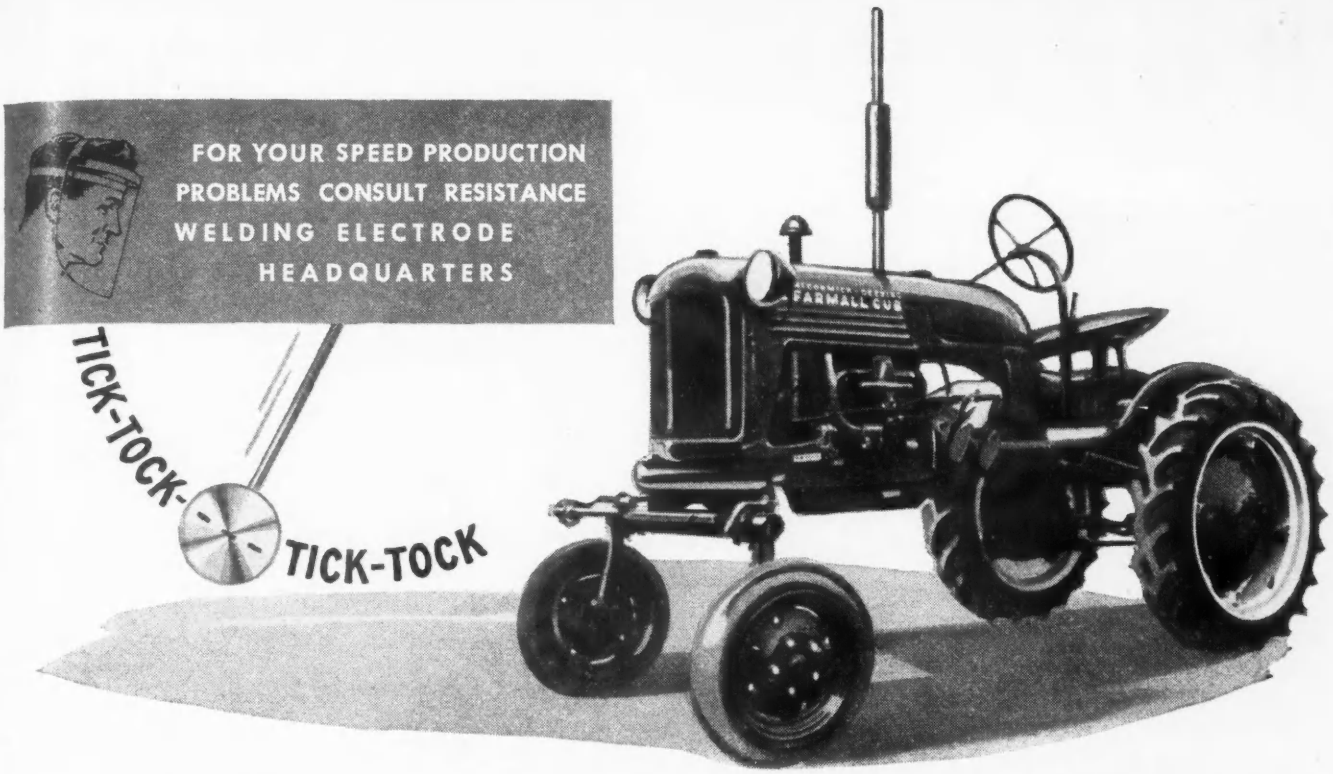
You will be further interested in his testimony that a seller who owns a fleet of trucks may legally consider transportation costs in those trucks as a cost of his doing business and is not required to charge the transportation cost to his customers. But a competitor, across the street, and making the precisely same article, shipping into the same areas, through trucks of a common carrier, is required to charge the customer the full freight. Thus, a seller's ability to compete in distant markets may well depend on whether he is financially able to purchase his own fleet of trucks.

There may well be many economic advantages of uniform f.o.b. mill selling. These advantages may well offset all of the disadvantages of f.o.b. mill selling. But so important a change in our national economy should only be put into effect at the expressed direction of the Congress. It now appears that such pricing philosophy is being imposed upon industry under statutes designed largely to prohibit unfair discriminations in favor of chain stores and to prevent unfair methods of competition largely in the form of false advertising.

The Congress must determine when, if ever, any seller is to be denied the right to compete for any business, in any market, with any competitor, under any pricing system including the absorption of freight, so long as he does not act pursuant to a conspiracy or agreement.

(*Turn to page* 78, *please*)


FUNCTION FITTED
POWER
TAKE-OFFS
ROCKFORD
CLUTCHES
Learning Your Clutch Needs
Analysing the Problem
Designing the Clutch
Planning Production
Tooling Up
Manufacturing
Checking and Testing
Supervising Installation
Servicing
Automotive and Aircraft
Trucks and Busses
Tractors and Road Machines
Farm Machines and Implements
Oil Field Rigs and Pumps
Industrial
Mowers and Light Machines
Engines and Marine Units
Machine Tools Production Units
Design and build your products to suit their functional needs — and let us build clutches best suited to control and transmit their power. Given the operating essentials of your products — we produce clutches to fit the specific needs of your product. Specializing in clutch building, our experience covers over thirty years of clutch research, design, production and field service in hundreds of industries. Write for our latest bulletin which shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS with diagrams of unique applications, capacity tables, diameters and specifications.
ROCKFORD CLUTCH DIVISION
BORG-WARNER
315 Catherine Street, Rockford, Illinois
ROCKFORD CLUTCHES and POWER TAKE-OFFS



A Tractor Every MINUTE!

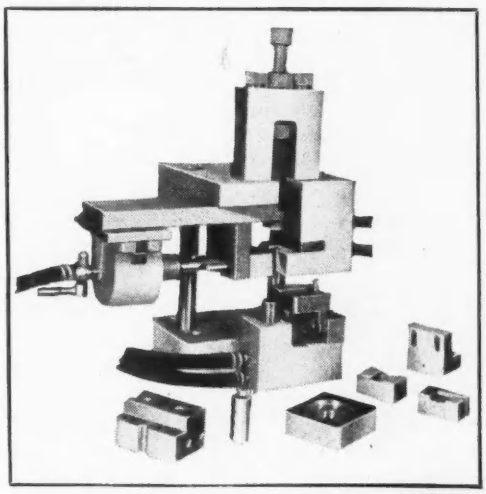
. . . With the aid of Mallory resistance welding dies, holders and electrodes

One complete Farmall tractor turned out EVERY MINUTE! That's the unbelievable production rate that International Harvester has achieved at its Louisville works with the aid of Mallory Resistance Welding die design and dies.

Working only from the finished sub-assembly parts, Mallory designed and built the resistance welding dies that are used to achieve this production rate. The essential role that Mallory dies, holders and electrodes are playing in this amazing output performance is clearly evident from this fact. At peak production, the welding department handles 374,000 pieces every 24 hours.

Mallory dies are proving their capacity for *S-P-E-E-D* in a spectacular way on this assignment. They're proving their capacity to effect ECONOMY, too.

Performance such as this typifies Mallory leadership in solving resistance welding problems. This leadership covers all types of resistance welding . . . such as butt, flash, seam, projection and spot. Remember, Mallory research has been more extensive in this field than that of any other manufacturer. Submit your resistance welding problems to Mallory.



Eight different sub-assemblies can be run on the same basic Mallory die with quickly changeable inserts—down-time being held to a minimum.

THE PIONEERS OF ELKONITE*, ELKALOY A*, MALLORY 3*, MALLORY 53B and MALLORY 100 METALS

*Reg. U. S. Pat. Off.

P. R. MALLORY & CO Inc

MALLORY RESISTANCE WELDING MATERIALS

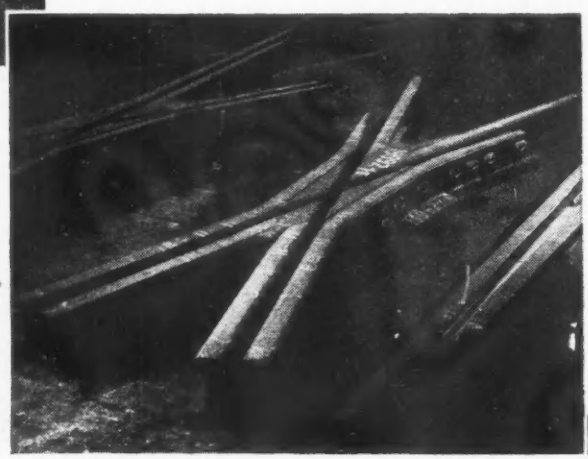
ELECTRODES—HOLDERS—SPECIAL DIES AND FIXTURES—
ELKONITE* METALS—ALLOY ROD AND BAR STOCK—
FORGINGS—CASTINGS—ACCESSORIES *REG. U. S. PAT. OFF.

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

If your equipment must withstand

Hadfield Manganese plates, strip and sheets find numerous uses in conveyors, chutes, troughs and bins where high resistance to extreme abrasion and severe impact are essential.

When made of **Hadfield Manganese**, grinding barrel liners have outlasted cast iron liners almost five to one—lasted 10 years instead of 2 or 3.



The ability of **Hadfield Manganese** to increase in hardness under repeated impact is illustrated by its use in railway frogs, in which, after service, the hardness of the wearing surface of the frog has shown an increase from original hardness of 185 Bhn to 495 Bhn.

severe abrasion and heavy impact

—prolong its life with

HADFIELD MANGANESE Steel

SOMEONE has very aptly described Hadfield Manganese as "*the steel that gets better the harder you use it.*" And it's true. For this wear-resistant Alloy Steel has the unusual characteristic of markedly work-hardening under impact and as a result actually becomes more and more wear-resistant in service.

This desirable characteristic of Hadfield Manganese Steel pays off BIG in increasing service life of such equipment as chutes, bins, screens, tumbling barrels, and other applications where hard usage and impact abrasion are encountered.

For example: In stamp mill shoes operating at 1500 ft. lb. blows, 100 to the minute, Hadfield Manganese Steel has outworn by 25% the next best of eleven alloy steels tested. In rock crusher jaws it shows only 1/10 the rate of wear of chromium steel; 1/17 the rate of wear of carbon steel.

Because Hadfield Manganese Steel is probably unsurpassed in its ability to work-harden—being superior in this respect even to austenitic stainless steels—it offers further important advantages in metal-to-metal contact applications. In either the wrought or cast form these advantages are outstanding. In sheaves, rails, and castings for railway crossings, frogs and switches, etc., where compressive loads or impact operate, Hadfield Manganese Steel develops a smooth, very hard surface that strongly resists wear—but does not abrade the contacting part.

Hadfield Manganese Steel has outstanding toughness even at low temperatures. At minus 100°F. it retains from 50% to 85% of its room temperature impact resistance. Thus it provides a valuable safety factor when used in appropriate applications which must operate at sub-zero temperatures or in Arctic climates.

Also Possesses Desirable Electrical Properties

From an entirely different angle, Hadfield Manganese Steel is of interest to manufacturers of electrical equipment. In the austenitic condition, Hadfield Manganese Steel possesses desirable non-magnetic properties. Fabricators will find its use for shielding undesirable stray currents and magnetic fields an important feature. Such applications as switchboard panels, conduits, lifting magnets, and transformer parts are a few of the many applications in this field.

• • •

We have been producing U·S·S Hadfield Manganese Steel for many years. Our engineers and metallurgists have pioneered its use in many applications. In railway equipment and track work. In electrical equipment. In the aggregate industry. In oil-well drilling. In the manufacture of cement and clay equipment. In the mining, construction, and quarrying industries.

If we can be of any help in applying this superior steel to your designs, call on us. Our experience is at your service.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST TO COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

USS

8-1616

UNITED STATES STEEL

It seems clear that Congress must determine what pricing practice will best promote our free enterprise competitive system and put it into law in such clear language that businessmen who want to be law-abiding citizens may know what conduct is required of them to live within the law.

Houdaille-Hershey Laboratories

(*Continued from page* 41)

Chemical Laboratory provides means by which studies in metal electrodeposition can be conducted on both a bench-size scale and on a pilot-plant scale in tanks of 40-gallon capacity. Results obtained from pilot-plant operations are capable of being interpreted in terms of full-scale plant operation.

A Metallurgical Laboratory contains several types of heat treating furnaces together with a punch press which is used for both hot and cold forming operations. There are, of course, included machines for making various physical tests required for complete metallurgical examination. Metallurgical studies are further assisted by a rather completely equipped Metallographic Laboratory including modern photomicrographic equipment.

A laboratory is included for studies in Organic and Physical Chemistry with particular relation to filter media and other considerations involved in the maintenance and clarification of lubricating oils.

For studies on automotive air cleaners, flow bench laboratories permit investigations into filter elements. A sound-proof room is equipped with proper instrumentation for the investigation of automotive air cleaner silencers.

A well-equipped machine shop serves the laboratory in making necessary gadgets and fixtures, and in addition is used for engineering development on products such as air cleaners, brake levers, etc.

Meeting Problems

In one of its large fields, that of supplying bumpers and other plated parts for the motor car industry, it is recognized that two particularly pressing problems face the industry. One involves the production of a better corrosion-resistant product which would ideally meet even the stringent conditions encountered in the winter time when all external motor car parts are subjected to a continuous onslaught of salt used to melt ice on the highways and thoroughfares. Efforts are therefore being extended to the production of single or composite plated coatings which will be either less porous or which will chemically resist such corrosive conditions. The other problem, considered to be of prime importance involves the development of required surface finishes, through electrochemical means, thus avoiding the much more tedious and expensive operations which have been carried out mechanically in the past.

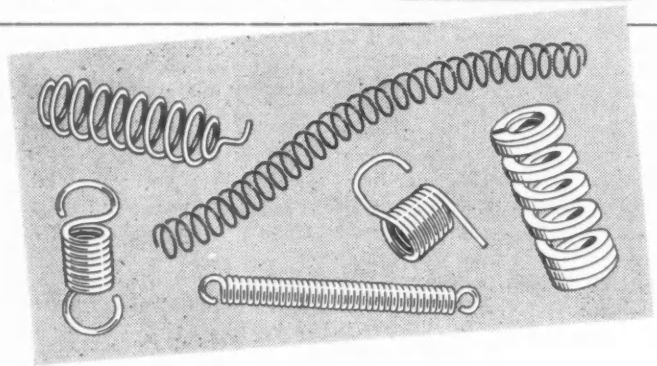
Metallurgical research is devoted to the strength and other characteristics of metals in relation to design and utility. Such matters are considered in conjunction with various methods and procedures of heat treatment, welding, etc.

Projects are under way both at the Research Laboratory and also at the plant of the Honan-Crane Corporation (Subsidiary of Houdaille-Hershey Corporation) to augment the present knowledge regarding equipment and filter media employed for the maintenance and clarification of cutting oils, lubricating oils, coolants, etc. Among the outstanding developments in this field has been an endless conveyor that may be installed in existing settling tanks, storage bins, hoppers, etc., for transporting dry or wet solids, chips or sludge to any desired point. The conveyor consists of a rivetless link chain to which Neoprene rubber flights are attached. Since the traverse is not confined to a single plane, the conveyor pathway can be engineered to fit any existing installation.

GUESSWORK IN

SPRING SELECTION

OFTEN PROVES EXPENSIVE!



There is a science in selecting the most practical, economical springs for particular applications. Should you choose springs for your products "because they were used in the old ones" or "I thought we'd try these," you'll probably find that it proves very costly.

It's a simple trick to specify the *right* springs *if* you have a Lewis Spring Engineer check the requirements and make his recommendations. Many times the Lewis Engineers have saved manufacturers hundreds, and even thousands, of dollars by suggesting the use of more economical, equally effective, springs for the jobs to be done.

You can depend on the Lewis Spring Engineers to offer you sound, reliable advice based on years of experience in spring design, manufacture and applicability to various products.

Why not take advantage of the Lewis Engineer near you? He'll be only too happy to give you his recommendations without obligation to you. Then you can be sure that you're not paying for "fancy extras" that don't contribute to product efficiency.

But call in the Lewis man early — while your product plans are in the blueprint stage — so he can help you decide on the most economical, practical springs or wireforms for the finished product.

LEWIS SPRING & MANUFACTURING COMPANY
2644 WEST NORTH AVENUE CHICAGO 47, ILLINOIS

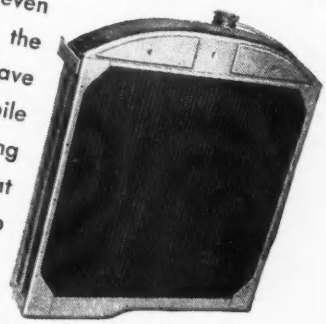
Lewis PRECISION SPRINGS

THE FINEST LIGHT SPRINGS AND WIREFORMS OF EVERY TYPE AND MATERIAL

The LONG STORY

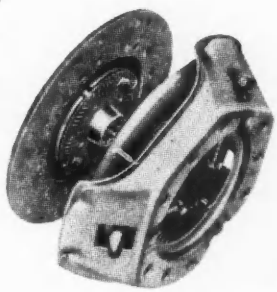
RADIATORS SINCE 1903

Long Manufacturing Company had a good radiator 'way back in 1903. It cooled the unpredictable engines of that era so efficiently that it was widely accepted, even then. Moving to Detroit, the auto capital, in 1910, we have worked with the automobile producers ever since, helping solve the problems of heat exchange. We'll be glad to help you, too.



CLUTCHES SINCE 1922

Long introduced the first really efficient, easily operated automotive clutch in 1922. Today, this clutch equips millions of cars, trucks, buses, tractors. Long semicentrifugal clutches, in a wide range of sizes and capacities, give smooth, trouble-free operation.



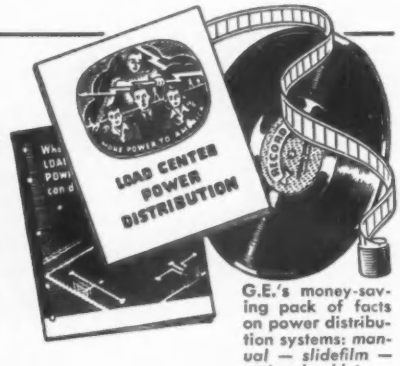
LONG MANUFACTURING DIVISION, BORG-WARNER CORPORATION, DETROIT 12 and WINDSOR, ONTARIO.

BW BORG-WARNER

LONG

CLUTCHES • RADIATORS • OIL COOLERS

One manufacturer saved $10,400 in power equipment—*CAN YOU?*



G.E.'s money-saving pack of facts on power distribution systems: *manual — slidefilm — review booklets.*

Get these eye-opening facts on power distribution systems to your key men—and see how much YOU can save

With "load-center" power distribution, one medium-sized manufacturer saved $10,400 in power equipment costs! Another cut equipment costs by 15 per cent—another by 17 per cent. *And* load-center systems help save money in *five other* ways, too. So get the facts to your key men *now*—open their eyes to this new way to power economy in your plant. It's easy. Here's all you do—

FREE to business management

Examine the General Electric *Load-Center Power Distribution Manual* free of charge. It covers every phase of load-center systems from a discussion of the fundamentals to examples of actual installations in plants like yours. It's prepared by experts, *without sales bias*, and it's designed to help you solve *your* power problems. Look through it. Satisfy yourself that it will pay off for you, then—

Get a *FREE* showing of the slidefilm

Your key men will quickly learn about power distribution systems in this modern, absorbing, *visual* way. Here's a General Electric slidefilm *with sound* that tells *what* load-center distribution is—*what* it can do for you. Prepared in terms that get over fast—stick in the memory. Show it, and—

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They highlight the lessons of the film, and they're ideal for individual study and review. You can have as many as you like.

ACT NOW! Don't delay. Remember—load-center distribution means *reduced costs*. So start the ball rolling, by filling in the coupon below, and we'll rush you G.E.'s *Load-Center Power Distribution Manual*. And, with it, we'll tell you how to arrange for a free showing of the slidefilm. *Do it now!*

FREE
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Attach to your business letterhead

General Electric Co.
Section S684-11
Schenectady 5, N. Y.

Please send me a sample copy of the G-E *Load-Center Power Distribution Manual* without cost or obligation, with details on how I can arrange a FREE SHOWING of the film. (Extra copies at regular manual price—$1.00.)

Name_____ Title_____

Company_____

Street_____

City_____

GENERAL ELECTRIC

AIRBRIEFS

(*Continued from page* 45)

make everything satisfactory. But where do you charge the lost revenue in the account book? NAL President Baker still faces the dismemberment hearings before the Civil Aeronautics Board, the payment of back wages to the striking pilots, the firing of his present pilots and the substantial losses already on his books. The ALPA faces public apathy, increased airline management distrust and a mounting power that can son surpass its responsibility. Behind them both hovers the spectre of nationalization that a new administration may well effectuate if airline financial insecurity continues.

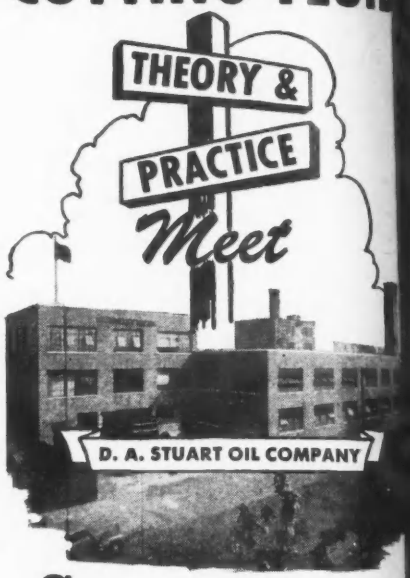
British Jets

The British have decided to take the plunge into jet bombers, after two years' careful observation of U. S. leadership. Handley-Page is readying a four-jet design incorporating sweepback wing. Armstrong-Whitworth is at work on a full-scale version of its tailless A.W. 52, which will be powered by eight jet engines and afford an interesting comparison with our own Northrop YB-49. A new entry is the English Electric Co., long-time aircraft subcontractor, with a four-jet design. None are expected to be flying before 1950.

Ramjet Progress

The Air Force has been experimenting with the subsonic ramjet engine for nearly three years. Experiments have been carried out with ramjet engines mounted at the wingtips of a North American F-51 Mustang propeller-driven fighter and the Bell XP-83 jet-driven fighter. More recently, a Lockheed F-80 has been flown on ramjet power alone, the first aircraft to accomplish the feat. It had appeared that the subsonic ramjet was the exclusive field of the Air Force, the Navy having rigorously pressed research work on the supersonic ramjet engine during this same period. Now comes the announcement that the Navy has successfully flown a pilotless missile on ramjet power. The Gorgon IV has remained aloft 10 min. and even this brief period is claimed a record for the type. All of these units have been developed by Marquardt Aircraft Co., Los Angeles. Although the subsonic ramjet consumes from eight to ten times as much fuel as the supersonic ramjet engine, the simplicity and cheapness of the engine makes it idel for expendable power, either in a missile or as droppable units on a fighter plane. Both Services seem willing to accept this tremendous fuel consumption as a necessary price to pay for short-period production of extremely high power.

Where
CUTTING FLUID



SELDOM does the most carefully developed scientific theory provide the final answer in the shop; neither is practical experience entirely dependable. It usually takes a combination of both in order to select and apply the cutting fluid that will give the best results on a given machining job.

D. A. Stuart Oil Company offers you a combination of theory and practical experience that pays dividends in better machining and fewer production headaches. The *theory* emanates from research in the modern D. A. Stuart laboratories; *practical* approach comes from men who have years of experience in shop problems and techniques. That is why Stuart products so often smooth out jobs on which other cutting fluids fail. Ask your D. A. Stuart Oil Co. representative to tackle your tough jobs.

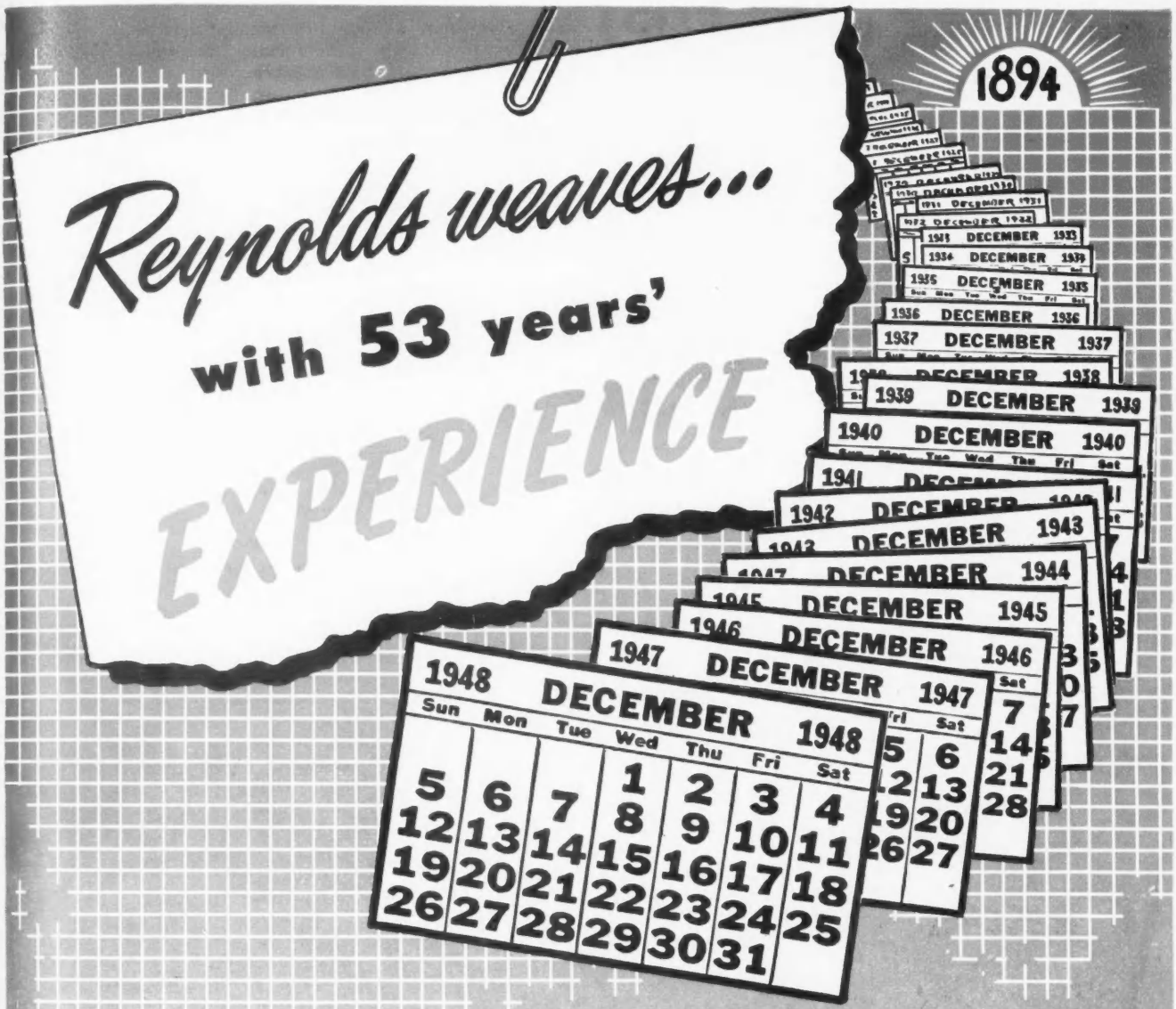
ON-THE-JOB REPORTS PROVE RESULTS

". . . D. A. Stuart's SOLVOL Water Mixed Cutting Compound was put in on a trial basis for milling high carbon alloy steel. High speed alloy cutters were used and it was found that SOLVOL increased the cutter life 3 to 4 times over what they had been getting. . . ." Write, if you would like to have a booklet on SOLVOL.

STUART *oil engineering goes with every barrel*

D.A. Stuart Oil CO.
EST. 1865

2733 S. TROY ST. • CHICAGO 23, ILLINOIS



When Horace G. Reynolds started the first wire cloth factory west of New York State, the year was 1894. Reynolds has been a *going* concern ever since . . . consistently going forward . . . to draw better wire, and to weave it into an improved wire cloth. Reynolds has applied its cumulative knowledge...gained not only from factory operation and laboratory research, but from direct contact and close co-operation with the nation's leading industries in meeting their wire cloth needs. This 53 years of experience is at your disposal . . . without cost or obligation. Consult Reynolds engineers.

Reynolds *Industrial* WIRE CLOTH

REYNOLDS WIRE CO., DIXON, ILLINOIS

1949 Oldsmobile

(*Continued from page* 29)

nations are available. The Futuramic Series 76 will occupy a substantially lower price range than the Series 98.

In introducing the new Series 76 Futuramic, Oldsmobile continues in general the same styling that marked last year's Futuramic Series 98 model. One of the most conspicuous style changes is evident in the front end. The leading portion of the front fender has been re-designed to accommodate headlamp, parking light and air intake louvres in one element. This new arrangement simplifies the frontal appearance and accents the Futuramic effect of broadness and lowness. In addition, an entirely new world symbol has been mounted on the forepart of the hood. This symbol follows the general design of Oldsmobile's new Futuramic emblem.

The Series 76 has an entirely new Fisher Body of Futuramic design, with greatly improved vision for all passengers and wider seats. As compared to its predecessor, the windshield of the 1949 Series 76 Oldsmobile is 31 per cent larger. The one-piece, undivided curved glass rear window is 54 per cent larger in area than that in last year's model, and the over-all increase in glass area in the four-door sedan model exceeds 21 per cent. The rear seat is seven in. wider than the previous 76 model. The 1949 Series 76 Futuramic Oldsmobile has a wheelbase of 119½ in. and an over-all length of 202 in.

New appointments in both Futuramic Series 76 and 98 models include an improved steering column, which encloses the Hydra-Matic drive control shaft and the automatic shut-off for the direction signal. Instrument grouping in the Series 76 follows the general Futuramic pattern of the Series 98.

Hydra-Matic drive will again be offered on all models. It will be standard equipment for 1949, in all Futuramic Series 98 Oldsmobiles. The Series 76 will continue to offer GM Hydra-Matic drive as optional equipment.

FASCO
Automotive
Circuit Breakers
FASCO
Automotive
Stop Light Switches
F. A. SMITH MANUFACTURING CO., INC.
ROCHESTER 2, NEW YORK
Announcing
A NEW COMPANY NAME
FASCO INDUSTRIES, INC.
Our corporate name now conforms more closely with the trade-mark "FASCO," used on our products. FASCO represents the same company . . . carries on our same long-established reputation for dependable quality . . . superior performance . . . right prices. From now on you can identify our products and company by the names "FASCO" and "FASCO INDUSTRIES, INC."
H. P. Toppin, PRESIDENT
H. M. Sylvester, SECRETARY-TREASURER
FASCO Table Type Fans
FASCO Fractional H. P. Motors
FASCO Desk Fans
FASCO Fractional H. P. Motors
FASCO Blowers
FASCO
Automatic
Kitchen Ventilators

Japanese Industry

(*Continued from page* 35)

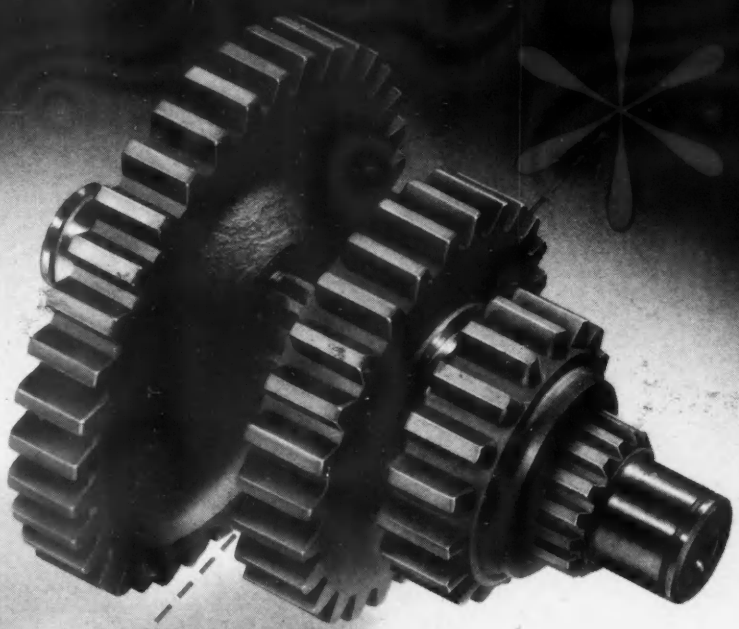
pendently. Each of such well-known makers as Nissan, Toyoda, Diesel, etc., has one dealer in each prefecture, therefore, for the three makes just mentioned there are approximately 150 dealers throughout the country. These dealers were authorized dealers for the Ford Motor Co. of Japan in Yokohama and the General Motors Co. of Japan in Osaka when about 20,000 to 30,000 cars and trucks were being imported yearly from America.

The business situation of dealers is not prosperous, but fair results are shown in the sale of parts and in making repairs. That is, though there are approximately 140,000 cars in Japan now, only 8900 of these are in good running condition and about 47,000 of the remaining are idle due to the need of repairs. Since output by the manufacturers is small each dealer handles no more than an average of 13 to 14 trucks per month for sales.

38,000 Yen for One Tire

The fact that one truck tire costs 38,000 yen in black market gives an idea of the tire situation in Japan. In fact, Japan at present is in an extremely difficult position with regard to rubber products. The big-five of automobile tire manufacturers in Japan are the Japan Tire Co., Ltd. (Bridgestone tire); Yokohamma Rubber Manufacturing Co., Ltd. (Yokohamma tire); Central Rubber Industry Co., Ltd. (Dunlop tire); Toyo Rubber Industry Co. (Toyo tire); and Otsu Rubber Industry Co., Ltd. (Otsu tire).

The entire production of automobile tires is estimated to be about 500,000 per year, but against this the demand is as high as 805,000 tires for truck use, 79,000 for bus use, 35,000 for passenger cars, 140,000 for small-type cars, totaling approximately 1,060,000 tires. —From *Jidosha Sangyo* (Japan).



*Meet a husky handful of gears

This sub-assembly—a cluster gear and a single gear mounted on a spline shaft—form a component part of an exceptionally compact transmission. A transmission that is called upon to move mountains of weight every day.

These gears must be rugged. They are. They must be extremely accurate. They are. They must seek to avoid selective fit. They do — thanks to manufacturing and inspection procedures that produce a high degree of interchangeability. And like all Double Diamond gears, they must pile up an impressive on-the-job work-record. This they have done, for a long, long time.

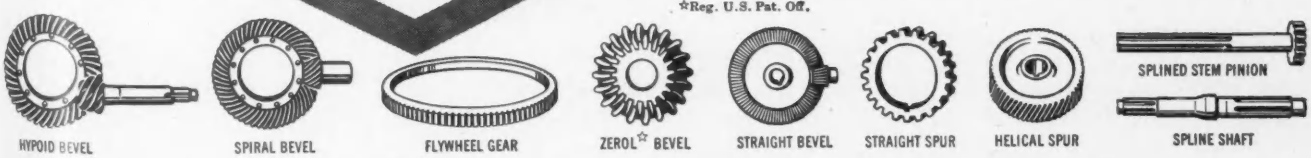
For over twenty-five years we have liked to think of Double Diamond gears in this way: that they will be made as well as we know how to make them—to do specific jobs as well as they can be done. This sub-assembly of gears and spline is one example of that thinking. Any job we are privileged to do for you will be another. Why not write?

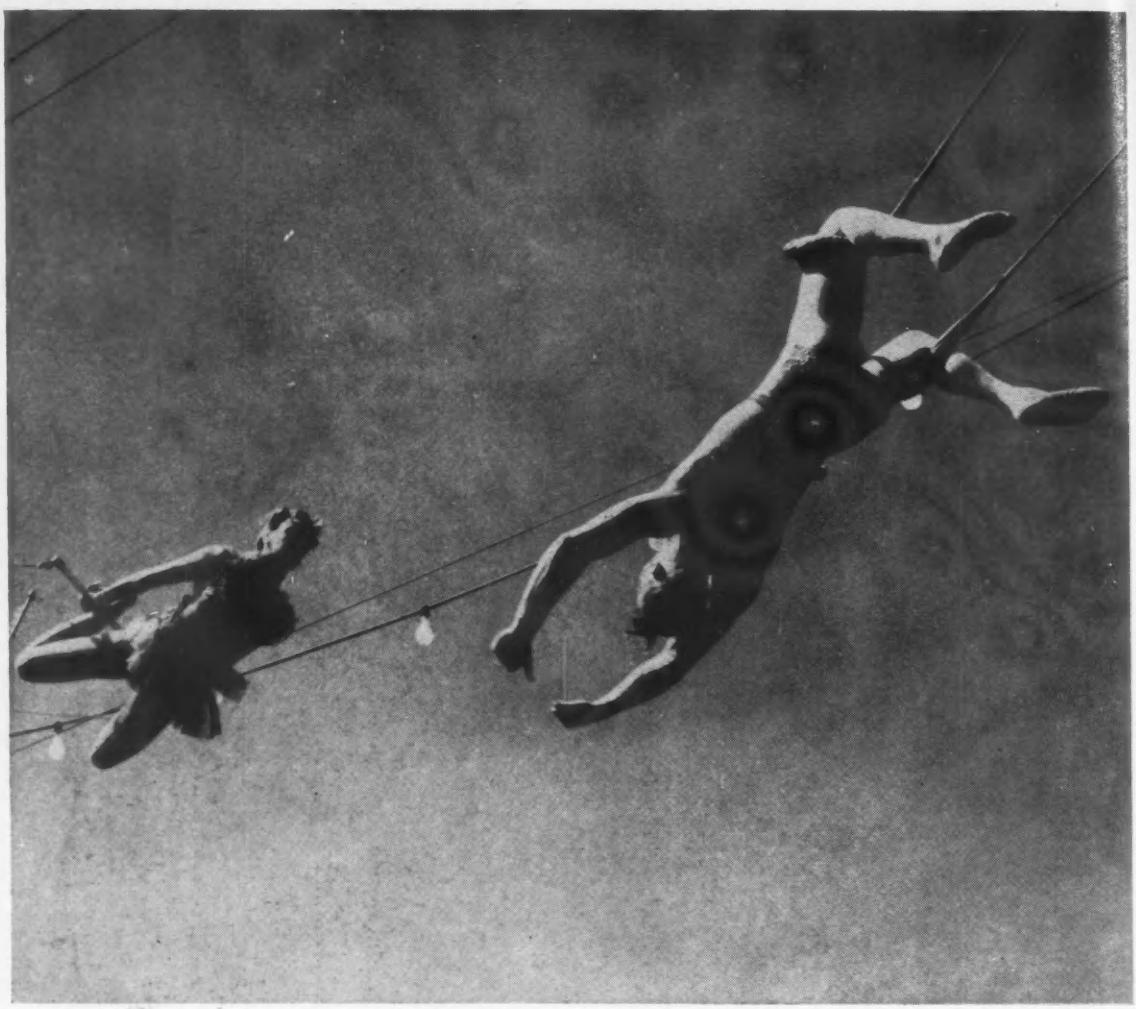
DOUBLE DIAMOND
TRADE MARK
GEARS

Made by
Automotive Gear Works, Inc.
RICHMOND, INDIANA

• • • FOR AUTOMOTIVE FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS • • • •

☆Reg. U.S. Pat. Off.





Do you want RESILIENCE?

Hycar has it - plus

ALL THESE 9 OTHER ADVANTAGES!

1. Abrasion Resistance—50% greater than crude rubber.
2. Extreme Oil Resistance—insuring dimensional stability of parts.
3. High Temperature Resistance—up to 250° F. dry heat; up to 300° F. hot oil.
4. Minimum Cold Flow—even at elevated temperatures.
5. Low Temperature Flexibility—down to −65° F.
6. Light Weight—15% to 25% lighter than many other American rubbers.
7. Age Resistance—exceptionally resistant to checking or cracking due to oxidation.
8. Hardness Range—compounds can be varied from extremely soft to bone hard.
9. Non-adherent to Metal—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)

Hycar
Reg. U. S. Pat. Off.
American Rubber

For more information, write or ask your supplier to write B. F. Goodrich Chemical Company, Dept. HD-12, Rose Building, Cleveland 15, Ohio.

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Rochester Carburetor for 1949 Oldsmobile

(*Continued from page* 34)

The Rochester GM carburetor has four minor external adjustments; choke rod, unloader, fast idle, and accelerating pump discharge adjustment. It is said that no special tools or gages are needed to accomplish these adjustments.

Idle System — The idle system controls the fuel/air mixture from the idle setting up to approximately 30 mph. The idle fuel first passes through the centrally located main metering jets to the tubes in the bowl each of which have calibrated orifices. These orifices control the amount of solid fuel metered by the idle system. At the junction of the cover and bowl, air mixes with the solid fuel through two calibrated air bleeds. This fuel/air mixture then passes horizontally through a cored passage in the cover, then downward through the idle passage in the housing to the throttle body where it is metered to the engine by the idle adjusting screws.

Partial Throttle System—At a point of sufficient throttle opening, manifold vacuum is applied to the nozzles which then take over the delivery of fuel to the engine. To a large degree, the calibrated main metering jets govern the fuel mixtures throughout this range of 30-60 mph, assisted by the air bleeds in the main well tubes admitting varying amounts of air from within the outer bowl to mix with fuel passing from the nozzles according to engine demand.

With this system, the fuel/air ratio to the engine is said to remain constant throughout the part throttle range.

Power System — A vacuum-operated power jet, consisting of a Neoprene diaphragm, stem, and calibrated spring located in the cover, provides the richer mixture needed for wide open throttle operation. This system is built upon the principle that sudden throttle opening is accompanied by an immediate corresponding decrease in intake manifold vacuum.

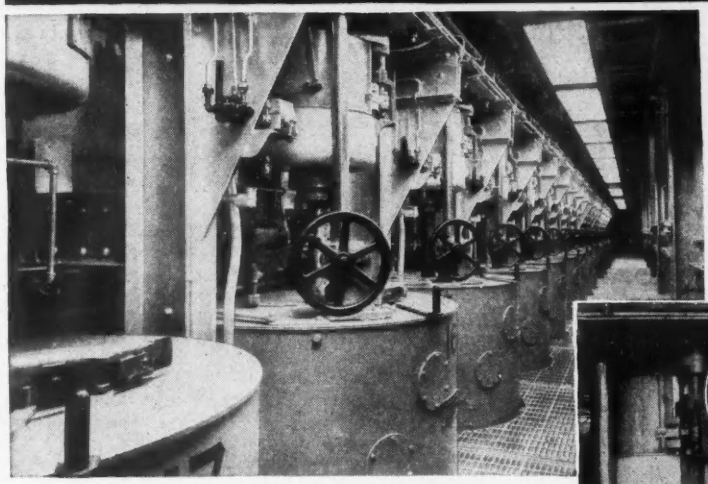
A direct vacuum passage through the carburetor throttle body, outer housing and cover to the intake manifold insures instantaneous diaphragm action to operate the power system. The diaphragm stem is directly above the power valve in the bottom of the float bowl. At any manifold vacuum above eight in. of Hg, the Neoprene diaphragm is held up by vacuum which in turn holds the stem above the spring loaded plunger in the power valve, so that no fuel passes through this valve. Opposing this suction is the power spring surrounding the stem which, at any vacuum lower than eight in. forces the stem down. This action unseats the spring loaded plunger in the power valve, permitting fuel to pass through the power valve where it is metered through restrictions in the main well channels.

Accelerating Pump System—The carburetor has a position displacement diaphragm type accelerating pump. The pump housing, diaphragm, pump jets, actuating lever and spring are attached to the bottom side of the float bowl. The pump diaphragm actuating lever is connected by a yoke, within the housing, to a pump lever and rod outside the housing. This pump rod is in direct linkage to the throttle lever.

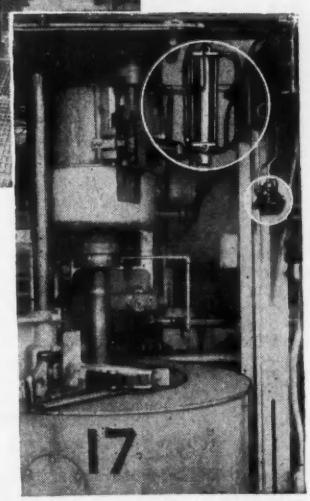
The source of fuel for the pump system originates in the float bowl. To exclude dirt from the pump system, a finely meshed screen is provided ahead of the intake check. Upon acceleration, the pump actuating spring moves the diaphragm against the cavity by means of a rack and pinion, thereby displacing fuel. This fuel passes vertically up the passage in the float bowl past the brass outlet pump check (valve) and

(*Turn to page* 86, *please*)

60 lb. "Manual Lifts" *Eliminated*



Battery of 17 Roberts "Centrifugals," built by Western States Machine Co., installed in new $6,000,000 plant of Holly Sugar Company near Brawley, Calif.



Close-up view of a Roberts Centrifugal shows a NOPAK Model E Air Cylinder which operates feed-pipe gate, and ⅜" NOPAK 4-Way Valve which actuates cylinder.

Feed-Pipe Gates on 17 "Centrifugals" Operated by NOPAK Air Cylinders and Valves

A battery of 17 Roberts semi-automatic "Centrifugals" are employed in this modern plant to spin the molasses off the sugar crystals. To simplify the task of charging each centrifugal, the feed-pipe gate . . . which formerly required an awkward, manual lift up to 60 lbs. every 4 to 6 minutes . . . is now raised by the flick of a NOPAK Valve lever which controls a NOPAK Model E, 4 x 13" Air Cylinder.

In a normal 8-hour working day, over 1600 manual lifts of 60 lbs. each are eliminated. Machine operators are relieved of unnecessary strain and fatigue, and machine efficiency is maintained at the high level characteristic of this new $6,000,000 plant.

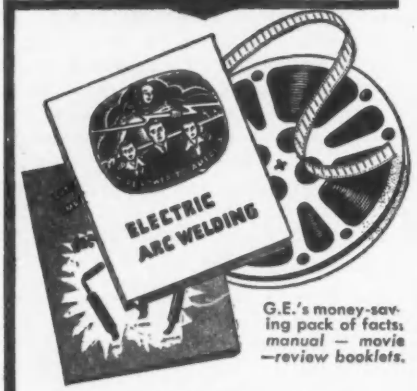
NOPAK Valves and Cylinders can help you achieve higher efficiency in your plant, or in your product.

GALLAND-HENNING MFG. CO.
2774 SOUTH 31st STREET
MILWAUKEE 7, WISCONSIN
•
Representatives in Principal Cities

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

A 5491-½I-A

METAL FABRICATOR CUTS COSTS 67 PER CENT —CAN YOU?



G.E.'s money-saving pack of facts: *manual — movie —review booklets.*

Get these facts to your key men and see how much you can save

- **WITH ARC WELDING, a fabricator cut costs on one large metal part by 67%.**
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In *your* plant, too, savings like these in time and money are possible—when your key personnel *know* the up-to-the-minute facts on arc welding—*know* how to put them to work on your problems. And it's so easy to get the facts to them *now*—at no cost to you!

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Examine the General Electric *Electric Arc Welding Manual* free of charge. It covers every phase of arc welding from a list of welding services for the user to specific examples of production feats in plants like yours. It provides *up-to-date* data about available equipment, power supply requirements, design and safety measures. It's written by experts, *without sales bias*, in a language your men can easily understand. Look through it. Satisfy yourself that it will pay off in your plant, then—

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Your key personnel will enjoy learning the newest facts on arc welding in this modern, absorbing, *visual* way. Here's a thirty-minute General Electric sound film in full color that wallops across its ideas—actually *shows* you precisely how arc welding is building better products cheaper in plants like yours. It's prepared by arc-welding specialists in terms that are grasped readily. Show it to your key men and—

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ACT NOW! Don't delay. Remember—today's arc welding offers you unprecedented opportunities to cut costs, improve quality, lick difficult production problems. So start the ball rolling by filling in the coupon below, and we'll rush you a copy of the G-E *Electric Arc Welding Manual*. Do it *now!*

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FREE TO BUSINESS MANAGEMENT

General Electric Co.
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Schenectady 5, N. Y.

Please mail me a sample copy of the G-E *Arc Welding Manual* without cost or obligation, with details on how I can arrange for a FREE SHOWING of the film. (Extra copies at regular manual price—$1.25.)

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GENERAL ELECTRIC

down the passageway to the pump jets, which spray the fuel onto the opposite edge of the main venturii to be mixed with air prior to entering the manifold.

Float System — The carburetor construction, with its concentric float bowl, is said to insure a constant fuel feed to the engine at all times regardless of the road angle, acceleration-deceleration, or sudden stoppage. Although the car may be subjected to various road angles, such as hill climbing, and the consequent change of fuel level angle within the bowl, the main metering jets, due to their central location in the bottom of the bowl, cannot become uncovered of fuel, thereby momentarily starving the engine. The discharge nozzles are also centrally located so that they are never below the fuel level in the bowl at any angle the car may assume, preventing any fuel spilling from the nozzle.

To aid in maintaining the proper fuel level in the carburetor bowl under all road driving conditions, the float tang is hinged to a calibrated balance spring. This float balance spring serves a two-fold purpose; first, it acts as a float vibration damper under all road conditions, and secondly, it permits the use of a smaller and more effective float.

Choke System—The carburetor employs a choke valve system composed of a thermostatic coil, choke piston and valve. It is controlled by a combination of intake manifold vacuum, atmospheric temperature and exhaust manifold heat. An offset weight on the choke shaft is balanced against the torque exerted by the thermostat and serves to control the time that the choke and "fast idle" remain in operation during engine warm-up. When the engine is started, air velocity into the carburetor air horn tends to aid the offset choke valve in opening slightly. Vacuum, through a calibrated hole in the cylinder, is applied to the bottom of the choke piston which is hinged to the choke valve shaft. This pull exerted upon the piston is balanced against the thermostat torque and the counterweight so that the engine will run smoothly during warm-up. As the engine warms up, heat from the exhaust manifold is drawn into the thermostat coil cover causing the thermostat coil to slowly relax, allowing the choke valve to move gradually to the full open position.

Many Good Things are Annual

BUT

AUTOMOTIVE INDUSTRIES

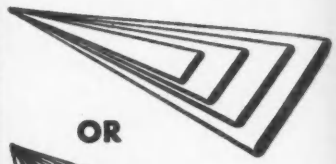
is PERPETUAL

in its SERVICE TO YOU

PAGE *Stainless Steel* WIRE

ROUND

FLAT



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SHAPED

"Page for Wire— Especially Stainless"

Remember that the next time you are looking for a responsible source for stainless steel wire. Wire has always been the business of PAGE. And PAGE has been working with stainless ever since its earliest development.

Whatever problem you may have involving wire—

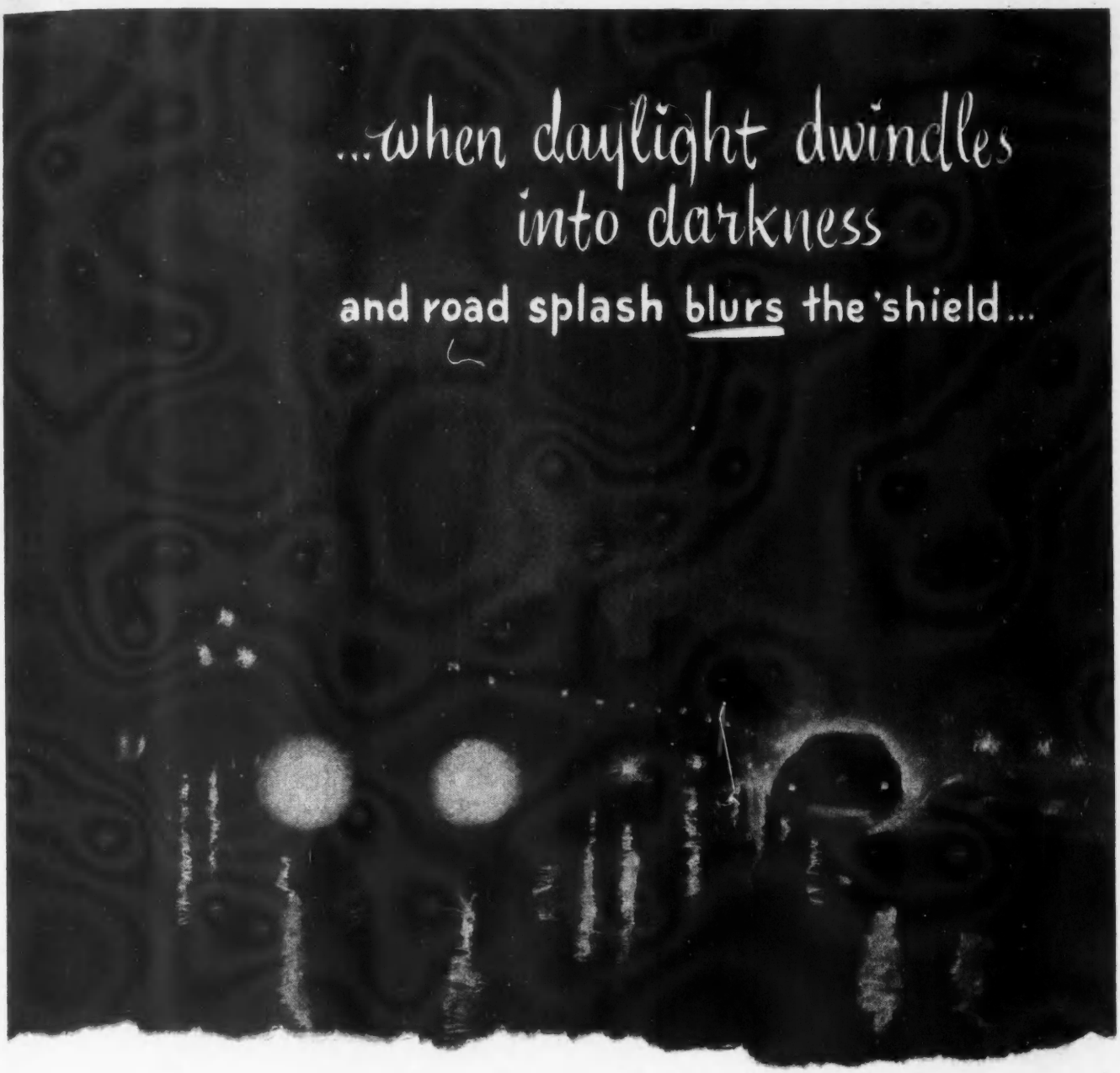
Get in touch with Page!

ACCO

Manessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Pittsburgh, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

In Business for Your Safety



Vacuum-operated, the Trico Windshield Washer imposes no drain on the battery and can be used freely to wash off road mist, dust, grime and mud splash.

...more than *two million* Trico Automatic Washers can respond to a button's touch to give clear vision during the most critical driving hours.

In making factory installations, Buick, Cadillac, Oldsmobile, Pontiac and Lincoln are gratifying public demand for the famous "Two Little Squirts." And other important makes are piping new production for easy dealer installation. Low initial cost and costless operation encourage universal use of this important safety aid. Trico Products Corp., Buffalo, New York.

TRICO *Windshield Washers*

Nothing to Pump · Vacuum Operated

General News

(*Continued from page* 23)

Wieland Stresses Human Factor in Management Conference

The human element of production now stands out so far ahead of tooling, blueprints, product schedules and plant layouts that management is beginning to all but take the workman apart to see what makes him tick and why. We have the word of Arthur J. Wieland, executive vice-president of Willys-Overland Motors, Inc., that our current production problems and our current techniques have to do with men rather than methods; with human emotions rather than improved techniques; and with incentives rather than improved machines.

Addressing the fall production conference of the American Management Association at Chicago, Ill., Mr. Wieland said there must be an exchange of ideas and an open-minded attitude to explore all angles of the problem, and that we must face the challenge of interpreting management's problems to labor and labor's wants and needs to management so that the twain can meet, not on the picket line, but at the paymaster's window.

Mr. Wieland believes that present production rates can be stepped up 10 per cent without changing present facilities, by providing better management, better relations with labor, and by stimulating the men's interest to secure higher productivity and less waste from their efforts. He said that as managers we must find methods through "human engineering" that will: (1) increase productivity; (2) improve quality; (3) eliminate waste; (4) restore pride in workmanship; (5) regenerate a belief that a man's best effort in his work is the only way to find satisfaction in that work and in his life; and (6) restore the dignity of work and make a good day's work a symbol of a free man's contribution to an abundant life.

The foreman was pictured as the representative of management in the plant by Archie A. Pearson, manager, Training Dept., Ford Motor Co., who in explaining the Ford policy, said: "Supervision at all levels is an integral part of management. Once a man sets his foot on the management ladder in the Ford Motor Co. we want him to follow our policies and programs; we want him to share our responsibilities and privileges; we want no artificial barrier put in his way if his ambition is to climb that ladder in accordance with the value of his abilities, energy or experience."

Cars in Southwestern France Using Natural Gas

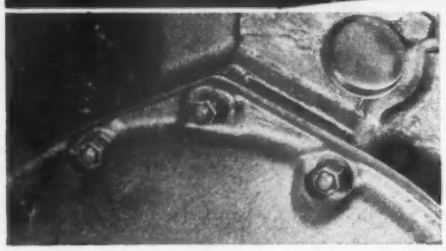
During the first quarter of 1948, 15,600 motor vehicles, largely trucks and buses, were operating in southwestern France on locally produced natural gas. In 1943 the number was only 2500; in 1945, 7800; in 1946, 11,600; and in 1947, 14,600. The first important drilling for natural gas was made near St. Gaudens, in 1938, and production was then 180,000 cu m a day. At the present time 400,000 cu m of natural gas are being extracted a day, and 70,000 cu m are being used daily by vehicles. At present, one cu m of natural gas is the equivalent of 1.3 litres of gasoline; however, as the octane number of the gas is 120, higher compressions can be used which would carry the equivalent up to 1.6 litres.

GM's Boyd Discusses Petroleum Trends

T. A. Boyd of GM's Research Laboratories, who collaborated with Charles F. Kettering and the late Thomas Midgley, Jr., in the development of leaded fuels, said recently that it is not reasonable to expect the supply of petroleum to last indefinitely, and, if and when petroleum fails, we are going to

(*Turn to page* 90, *please*)

Absolute security for bolted assemblies —at low cost!



PALNUTS lock regular nuts holding transmission housing to engine.

PALNUTS lock regular nuts on support for drive shaft tube.

WHEREVER a bolted assembly *must* stay tight in service, add a PALNUT self-locking nut on top of the regular nut. Here are the advantages:

- Holds regular nut and bolt to original tightness, under severest vibration
- Easy, fast assembly with hand or power drivers
- Regular nut and PALNUT cost less than most other locknuts
- Requires no more space
- Unaffected by heat or oil
- No damage to nut or nut seat
- May be removed and re-used

The unfailing security of PALNUT double-locking action is proved by the increasing use on connecting rods, brake parts, exhaust manifolds, body hold down, front and rear engine mountings, etc. Send details of your assembly for samples and data.

Note: This ad describes the regular type self-locking PALNUT used as a locknut. Many other types available for use as self-locking load-carrying nuts for assembly of moulding, medallions, nameplates, etc.

THE PALNUT COMPANY

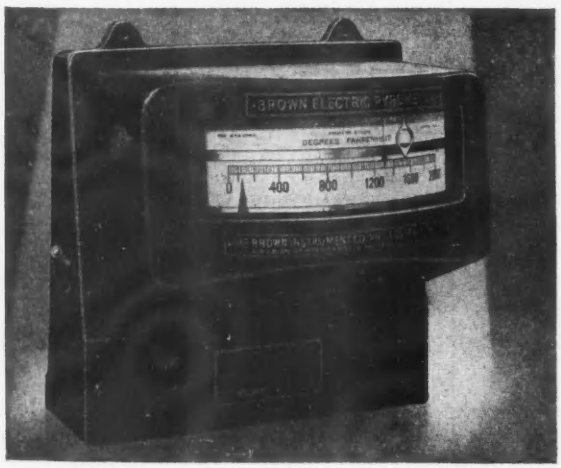
60 CORDIER ST., IRVINGTON 11, N. J.

Detroit Sales Office:

5-213 General Motors Bldg., Detroit 2, Mich.

PALNUT TRADE MARK Self-Locking NUTS and FASTENERS

This *Inexpensive* Instrument Provides *Dependable* Control



BROWN Indicating Pyrometer Controller

STOCK DELIVERIES ON STANDARD RANGES

Wherever heat is used in your plant and temperature is not automatically controlled, quality is bound to suffer. Manual control is costly and inefficient.

The Brown Indicating Pyrometer Controller provides completely automatic control at low cost. Operating on the simple millivoltmeter principle which requires neither batteries nor standard cells, this instrument indicates temperature on a direct reading 6" scale and regulates it automatically.

Simple, dependable control is provided by glass-enclosed mercury switches which are not affected by dirt, dust or corrosive atmospheres. Maintenance is negligible.

The complete story is told in Catalog 10-1. A copy will be sent to you upon request without obligation.

THE BROWN INSTRUMENT CO., 4548 WAYNE AVE., PHILADELPHIA 44, PA.
DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.

Offices in principal cities of the United States, Canada and throughout the world.

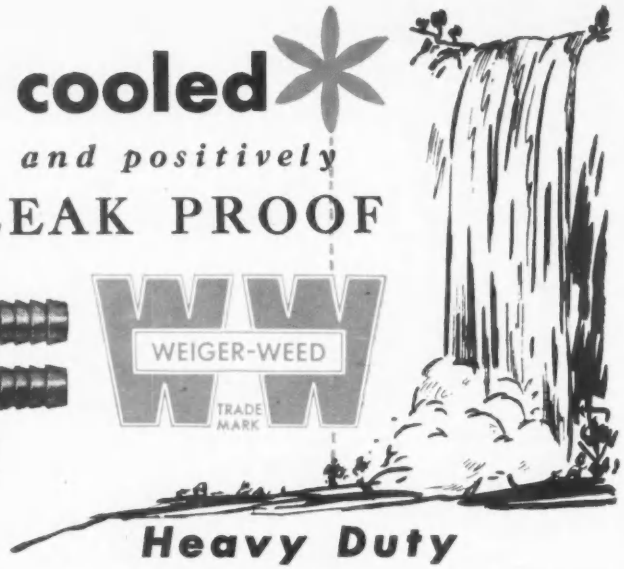
BROWN *Advanced Instrumentation* **FOR BETTER PROCESSING**

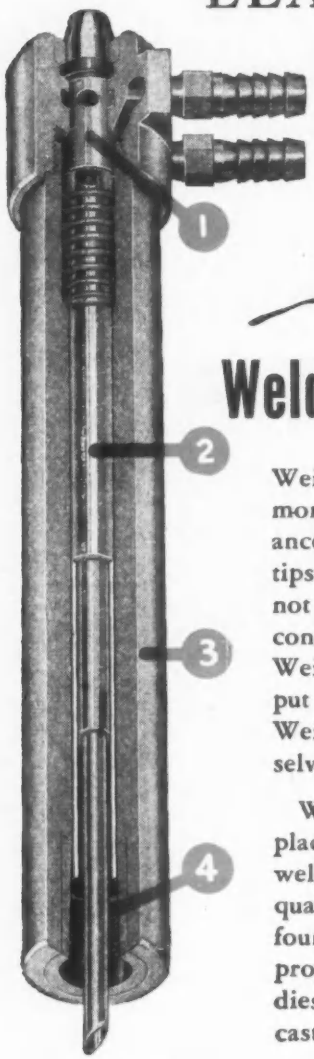
Product of MINNEAPOLIS **Honeywell**

water cooled*

and positively

LEAK PROOF





WEIGER-WEED TRADE MARK

Heavy Duty

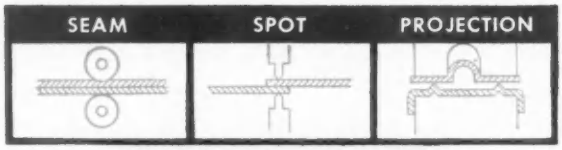
Welding Electrode Holders

Weiger-Weed Holders are designed to deliver more than enough cooling water for any resistance welding application using replaceable tips. And Weiger-Weed Holders positively do not leak at any water pressure which hoses and connections will withstand. When you put Weiger-Weed Holders on your machines, you put an end to cooling and leakage problems. Weiger-Weed Holders quickly pay for themselves in maintenance savings.

With these holders and Weiger-Weed Replaceable Tips, one can hardly help but reduce welding costs. And this same metallurgical quality and engineering forethought will be found in Weiger-Weed seam welding wheels, projection welding dies, flash and butt welding dies and special alloy bars, forgings and castings.

Weiger-Weed engineers and facilities are at your service to help you solve your resistance welding problems, whatever they may be. Weiger-Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Ave., Detroit 4, Michigan.

(1) Hardened stainless steel knockout plug and leakproof water seal. Spring return assures free water ports and proper tip seating. (2) Non-rusting, nonmagnetic knockout tube. (3) Strong, heavy body assures maximum conductivity, withstands heavy clamping pressure. (4) Hard alloy taper socket will not get out of round or leak.



WEIGER-WEED TRADE MARK

Resistance Welding ELECTRODES

DIES • TIPS • WHEELS • HOLDERS

DIVISION OF FANSTEEL METALLURGICAL CORPORATION

General News

(*Continued from page* 88)

have to fall back on other sources for liquid fuels. He emphasized, however, that failure of the petroleum supply is some distance away, according to the best authorities on the subject. Mr. Boyd stated that, fortunately, our reserve of natural gas is as large as that of petroleum, our supply of oil shale is equivalent to nearly five times the known reserve of petroleum, and our coal supply is 60 times as large as petroleum. When we have to produce liquid fuels out of these materials, he declared that the making of gasoline is going to be a chemical industry to an even greater degree than is the petroleum refining industry today. He pointed out that a plant now under construction at Brownsville, Tex., is expected to make out of natural gas by synthetic means 7000 bbl of gasoline and diesel fuel a day, along with a large amount of oxygen bearing compounds as by-products.

Reelect Schmunk President of AAA

R. J. Schmunk, Cleveland, O., was reelected to serve a second term as president of the American Automobile Association at the 46th annual round-up which was held recently in San Antonio, Tex. In addition to reelecting President Schmunk, the following officers were also elected: senior vice-president, Lou E. Holland, Kansas City, Mo.; vice presidents, John A. Rupp, Allentown, Pa.; E. B. McDaniel, Portland, Ore.; William B. Spencer, Providence, R. I.; G. Leslie Hall, Norfolk, Va.; Glenn W. Stephens, Madison, Wis.; Senator Owen Brewster, Me.; secretary, Ralph Thomas, Detroit, Mich.; treasurer, Corcoran Thom, Washington, D. C.; and assistant treasurer, Frederick P. H. Siddons, Washington, D. C.

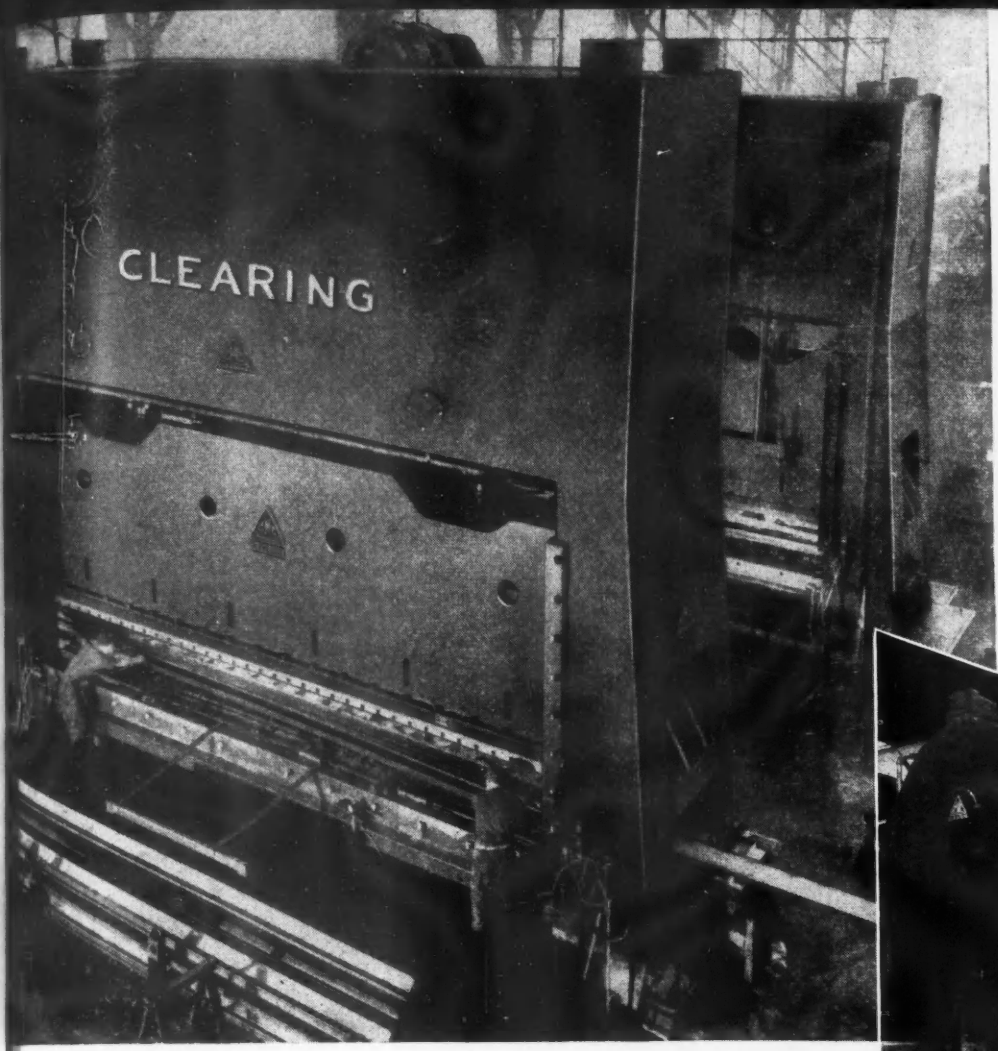
McCord to Increase Number of Shares

McCord Corp. stockholders have voted to increase authorized common stock to 400,000 shares. The increase will be on the basis of one new share for each share currently held. At present there are 227,823 shares authorized.

SAE Awards Horning Memorial to Adolphus Pilger

The 1947 Horning Memorial Award of the SAE will be presented to Adolphus C. Pilger, Jr., Tide Water Associated Oil Co., during the SAE Annual Meeting in Detroit, Jan. 10-14, for a paper presented during the 1947 SAE Summer Meeting. Mr. Pilger's paper was entitled "Field Testing of Motor Oil and Gasoline."

(*Turn to page* 92, *please*)



CMC
CLEARING
MECHANICAL & HYDRAULIC

Above: CLEARING 3000 TON CRANKLESS PRESSES making rails for automobile chassis.

Right: CLEARING 75 TON GAP FRAME PRESSES in a large appliance plant.

LARGE OR SMALL—

THEY SPELL ECONOMY

Thirty-foot rails for bus frames or parts for a household appliance — Clearing presses turn them out swiftly and completely, ready for assembly with no labor costs for grinding, drilling or other subsequent operations. Because Clearing presses deliver accurately formed work, assembly is smooth and rapid. No wonder that production costs are driven down.

Equally important, Clearing affords unique features of design and construction which yield longer die life, with fewer interruptions to production for die repair or regrind. Every production man knows what these items mean on a cost sheet.

Whether you need 60 tons capacity or 3,000 tons or more, Clearing can furnish a press that will produce for you with maximum economy when all factors are taken into account. That's a plain, straightforward statement. We'd like to have you make us prove it.

CLEARING MACHINE CORPORATION • 6499 West 65th Street • Chicago 38, Illinois

CLEARING THE WAY TO EFFICIENT MASS PRODUCTION

CMC
CLEARING

106 cost-saving ways to use electronics

Down-to-earth course trains your personnel to apply them in your plant

To get the most out of electronic equipment, your personnel must thoroughly understand its fundamentals, advantages, and limitations. To help you with this training problem, General Electric has prepared a complete, easy-to-take visual course in industrial electronics.

Here's what the G-E electronics training course offers—

1. **A 146-page instructor's manual,** designed to give your employees a *practical* understanding of the fundamentals of electronics...tell them how they're applied in modern industry. It enables a member of your organization to conduct the 12-lesson course.
2. **Twelve Slidefilm Lessons** each with its own record. The lessons are phrased in non-technical language ...devoted to *specific applications.*
3. **Twelve Review Booklets,** illustrated, for reference and home study.

Free inspection offer—

Once you've seen the scope of this fact-packed course, we know you'll be convinced it will pay off for you. So, examine the instructor's manual *without obligation.* After you've seen it, you will want to order the complete course which is offered at cost... only $120.00.

FREE TO BUSINESS MANAGEMENT

Attach to your business letterhead

General Electric Co.
Section R684-5
Schenectady 5, N. Y.

Please send me a sample copy of the G-E *Industrial Electronics Training Course Manual* (GES-3330) without cost or obligation.

Name_____ Title_____

Company_____

Street_____

City_____

GENERAL ELECTRIC

General News

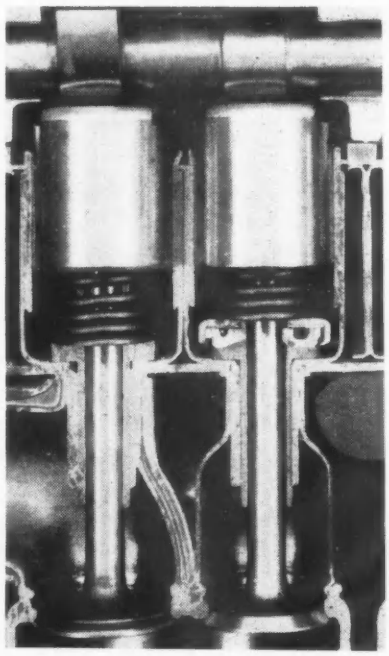
(*Continued from page* 90)

Aviation Research Machine Makes High Temperatures

D. M. Patterson, project engineer, Mechanical Branch Equipment Laboratory, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, O., declared recently at the annual meeting of the American Society of Mechanical Engineers, that a machine now being built for the U. S. Air Force will duplicate temperatures and heat strains built up in aircraft and missiles traveling at supersonic speeds, and pave the way for temperature-controlled flights.

USAF Orders 1132 Airplanes from North American

New orders recently announced by Secretary of the Air Force W. Stuart Symington have given North American Aviation, Inc., a total of 1132 airplanes on order for the U. S. Air Force. The new orders added to those previously held give North American orders for 674 of its F-86 jet fighters, 190 of its B-45 four-jet bombers, and 268 of its T-28 trainers.



CROSLEY ROTATOR

The exhaust valve rotators adopted by Crosley Motors, Inc., on the Crosley engine are an application of the Thompson Products' "RotoCap" device, especially calibrated for the Crosley engine. The valve rotator is shown in the above photograph on the right. According to a statement by Paul Klotsch, Crosley chief engineer, they have found that with the use of valve rotators, valve life has been increased by 200 to 300 per cent.

(*Turn to page* 94, *please*)

Silicone News

DC SILICONES

DC 41 Silicone Grease Designed for Hot Spots

In the wheel bearings of the tunnel kiln cars at Alamo Pottery of San Antonio, Texas, even the most heat resistant organic greases were considered unsafe. Alamo engineers could have reduced the hazard by expensive redesigning but they found that DC 41 Silicone Grease provided a better and more economical solution.

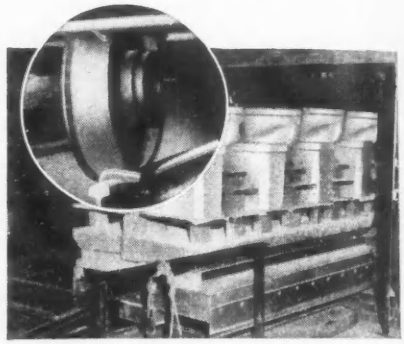


PHOTO COURTESY ALAMO POTTERY, INCORPORATED

DC 41 Silicone Grease in the roller bearings of tunnel kiln cars eliminates a fire hazard and reduces maintenance costs.

Vitreous china plumbing fixtures are baked by continuous process in a gas fired tunnel kiln. Alamo uses conventional sand seals to limit baking temperatures of 2300° F. to the central portion of the kiln. Even so, the kiln car wheel bearings are exposed to temperatures too high for organic greases. The best petroleum greases tested volatilized and presented a fire hazard. Bleeding was so extensive that it was necessary to relubricate the bearings every time a cart entered the oven.

At the suggestion of our sales engineers, Alamo tested DC 41 Silicone Grease. They have been using this semi-inorganic silicone grease for several months with excellent results. It makes the fire hazard negligible and it cuts relubrication from a daily to a monthly schedule.

Dow Corning Silicone Greases are being specified more and more frequently to solve lubrication problems because they possess low volatility, excellent heat resistance and good lubricity. For more information call our nearest branch office or write for data sheet D1-M.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

Atlanta • Chicago • Cleveland • Dallas
Los Angeles • New York
In Canada: Fiberglas Canada, Ltd., Toronto
In England: Albright and Wilson, Ltd., London

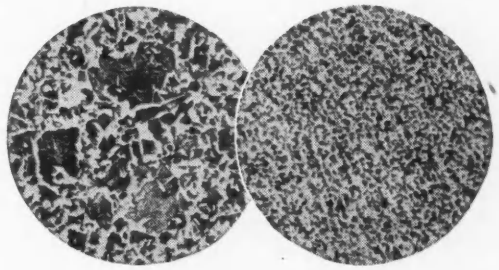
Dow Corning
FIRST IN SILICONES

YOU CAN DEPEND ON

VANADIUM

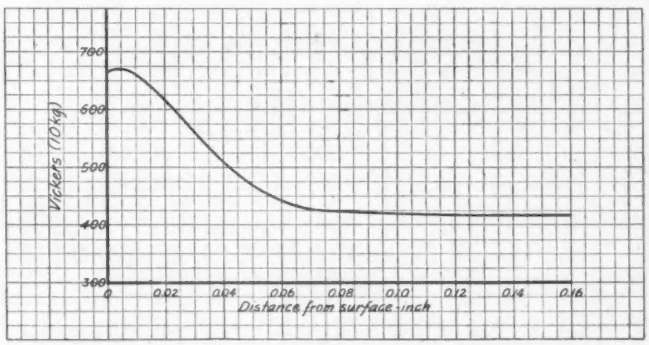
to give you grain size control, high performance, and ease of processing

GRAIN SIZE is refined by the addition of vanadium, the balance between strength and toughness is improved, and greater uniformity is promoted between transverse and longitudinal properties.



0.34 C 0.34 C, 0.20 V

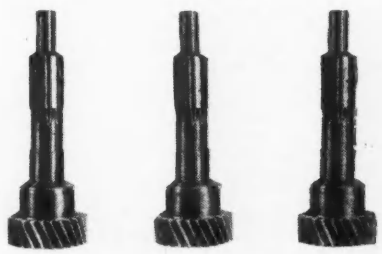
HIGH PERFORMANCE follows the use of vanadium in constructional steels. In carburized parts, for example, the well-integrated bonding between case and core, inherent in vanadium carburizing steels, assures excellent shock-resisting properties and maximum service life.



Hardness penetration graph of Chromium-Vanadium A 6120 steel, with a light case (0.80–0.85% carbon) in outer .010 inch

EASE OF PROCESSING—Uniformity of vanadium steels from heat to heat, with easy and uniform response to thermal and mechanical treatments, brings large compensation—savings far over-shadowing differences in initial materials costs.

Our metallurgists will be glad to assist you in the application of vanadium to meet your requirements.



MAKERS OF FERRO-ALLOYS VANCORAM CHEMICALS AND METALS

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

Here's Efficient Welding ..... On C-F Positioners

When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made downhand—that's efficient welding!

Weldors spend more time welding—do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

Write for Bulletin WP24—an illustrated circular detailing the specific advantages of C-F Positioners.

CULLEN-FRIESTEDT CO.

1322 S. Kilborn Avenue Chicago 23, Ill.

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds

General News

(*Continued from page 92*)

Ford Promotes Four Sales Executives

J. R. Davis, Ford vice president of sales and advertising has announced that Donald C. Burdette, assistant manager of the central region in Detroit has been promoted to parts sales manager, under Henry M. Strout, manager of the Ford parts and accessories sales department. John F. Connors, formerly manager of the Washington, D. C., sales district, succeeds Mr. Strout as manager of the Somerville, Mass., district. Howard W. Cook, who has been assistant manager in the Washington district, has been promoted to succeed Mr. Connors. R. H. East, formerly manager of the parts and accessories sales department of the southeast region with offices in Chester, Pa., has been appointed district sales manager in Atlanta, Ga., replacing R. J. Burke, who is resigning to become a Ford dealer.

Small Named Research Head of Hooven, Owen, Rentschler

After a long period of service in the U. S. Navy, Commodore Lisle F. Small, USN (Ret.) was appointed director of research of the Hooven, Owen, Rentsch-

(*Turn to page 96, please*)

"They're rolling off the line . . ."

HARGRAVE "I" BAR and CARRIAGE CLAMPS

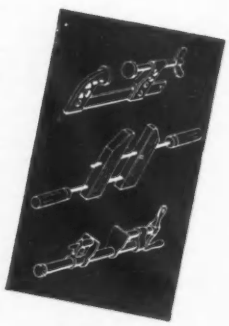
We're producing No. 640 I-Bar Clamps and our new #530 Carriage Clamps in greater quantities than ever. Get immediate delivery from stock.

The #530 Carriage Clamp frame is made of a powerful new metal far stronger than malleable . . . proved under INDIVIDUAL POWER TEST. Openings in all popular sizes.

The Hargrave "I" Bar Clamp is rapid and powerful. Notches in web permit quick action, no slipping. Screw is steel, heat treated to prevent bending and battered threads. Opening from 2 ft. to 10 ft.

Write for Catalog of complete line.

SEE YOUR NEARBY INDUSTRIAL DISTRIBUTOR



HARGRAVE
The Cincinnati Tool Co.

4056 Montgomery Road
Cincinnati 12, Ohio

FOR BUS, TRUCK, AND TRACTOR APPLICATIONS

GENERAL CONTROLS

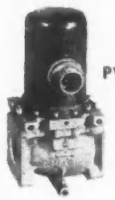
hi-g* VALVES

PV-1

Normally closed shut-off valve of the electro-magnetic type—various magnet sizes—full ported or restricted parts—for all types of fluid, gasoline, air, water, oils, etc.

PV-9

Pilot Piston valve for medium and high pressure applications. Normally open and normally closed types. Controls hydraulic oils, fuels, lubricating oils, water, etc. 50 to 3000 P.S.I. operating pressure.

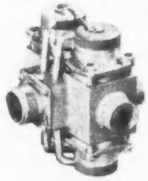


PV-16

Electric motor valve, suitable for fuel, hydraulic fluid and lubricating oil shut-off. High flows at low pressure drop, explosion-proof motor and switch cover.

PV-11

Three-way Electro-Magnetic valve used for distribution of fluid flow or for "feed in" and "exhausting" fluid from a cylinder, piston or vessel.



PV-7

Four-way selector type control-operating pressure up to 3000 P.S.I. for control of fluid pressure operated cylinders.

PV-2

Same as PV-1 except is normally open type. For control of various fluids, oil, water, gasoline, air, etc.

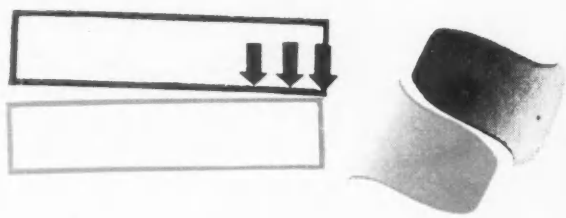
G C **GENERAL CONTROLS**

Manufacturers of Automatic Pressure, Temperature and Flow Controls.

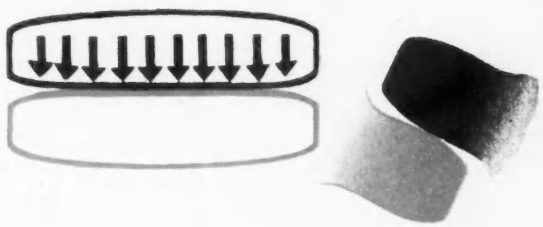
FACTORY BRANCHES: BIRMINGHAM (3), BOSTON (16), CHICAGO (5), CLEVELAND (15), DALLAS (2), DENVER (10), DETROIT (8), GLENDALE (1), HOUSTON (2), KANSAS CITY (2), NEW YORK (17), PHILADELPHIA (40), PITTSBURGH (22), SAN FRANCISCO (7), SEATTLE (1). DISTRIBUTORS IN PRINCIPAL CITIES.

THIS MECHANICAL PRINCIPLE

Prolongs gear life and increases load capacity!



Pitch line section through two conventional teeth where a slight misalignment of the gears' axes throws heavy end bearing on both teeth.

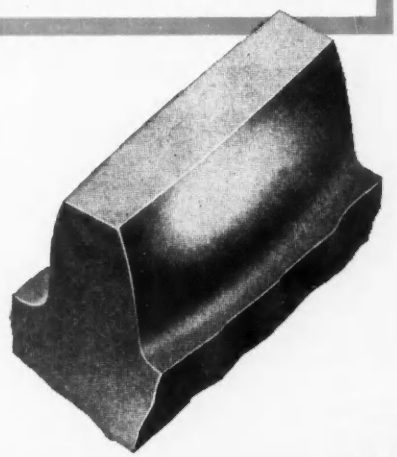


Similar section through two Elliptoid teeth. Although bearing extends across 85% of the tooth face, misalignment cannot impose end bearing on either tooth.

If you wanted to break a gear tooth, you could do it easier by hammering on one end rather than in the center of the tooth.

That is just what gear manufacturers want to avoid, so they prevent dangerous end bearing on gear teeth by shaving them to the Elliptoid form. Then slight misalignments due to deflections and manufacturing tolerances can't put critical loads on the ends of the teeth where they are most vulnerable. In other words, the specified lead tolerance is taken in a curved line rather than a straight one.

The Elliptoid gear tooth form is produced on Red Ring Rotary Shaving Machines. For further information, write for descriptive bulletin.



The Elliptoid or crowned tooth, exaggerated to illustrate the principle involved. Actual modification is normally less than .0005".

2868

NATIONAL BROACH AND MACHINE CO.
5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

Box car builder saves $2925 a day —CAN YOU?

General Electric's money-saving pack of facts: *manual—film—review booklets.*

Get these facts to your key men and see how much you can save

- **WITH RESISTANCE WELDING, a box car builder cut costs by $2925.**
- **WITH RESISTANCE WELDING, a small transformer manufacturer saved $84,000 per year.**
- **WITH RESISTANCE WELDING, a radio tube maker stepped production up to an *unprecedented 2,500 per day*.**

In your plant, too, savings and production feats like these are possible—when your key personnel *know* the up-to-the-minute facts on resistance welding—*know* how to put them to work on your problems. And it's so easy to get the facts to them *now*—at no cost.

***FREE* to business management**

Examine the General Electric *Resistance Welding Manual* free of charge. It covers every phase of resistance welding from a glossary of welding terms to specific industrial applications in plants like yours. It tells *where* resistance welding can be used—*how* it can be used—exactly *what* benefits you can expect from it. It's written by experts, *without sales bias*, in a language your men can easily understand. Look through it. Satisfy yourself that it will pay off.

Get a *FREE* showing of the film

Your key personnel will get a kick learning the newest facts about resistance welding in this modern, absorbing, *visual* way. Here's a General Electric sound film in full color that wallops across its ideas — actually *shows* you how resistance welding is building better products for less in plants like yours. It's prepared by resistance-welding specialists in terms that are grasped readily. Show it to your key men.

ACT NOW! Don't delay. Remember — resistance welding saves you money in *five* ways—and does a better job, too. So start the ball rolling by filling in the coupon below and we'll rush you a copy of the G-E *Resistance Welding Manual*. *And*, with it, we'll tell you how to arrange for a free showing of the film.

FREE TO BUSINESS MANAGEMENT

Attach to your business letterhead

General Electric Co.
Section F684-10
Schenectady 5, N. Y.

Please send me a sample copy of the G-E *Resistance Welding Manual* without cost or obligation, with details on how I can arrange for a FREE SHOWING of the film. (Extra copies at regular manual price—$1.00.)

Name_____ Title_____

Company_____

Street_____

City_____

GENERAL ELECTRIC

General News

(*Continued from page* 94)

ler Co., Hamilton, O. Current project of interest to automotive engineers is the development of the reciprocator-gas turbine power unit which is being groomed for railroad locomotives. This type of power generator is also intended for marine applications, and may have application in other fields of automotive power.

Werner J. Blanchard

Werner J. Blanchard, 48, general manager, GM's Aeroproducts Div., died Dec. 4 near Columbus, O.

Fred S. Welch

Fred S. Welch, 69, automobile manufacturing pioneer and co-founder of the Welch Motor Car Co., died on Dec. 2 in Pontiac, Mich.

SHIPMENTS OF CIVIL AIRCRAFT AND AIRCRAFT ENGINES AND OTHER PRODUCTS OF THEIR PLANTS.*

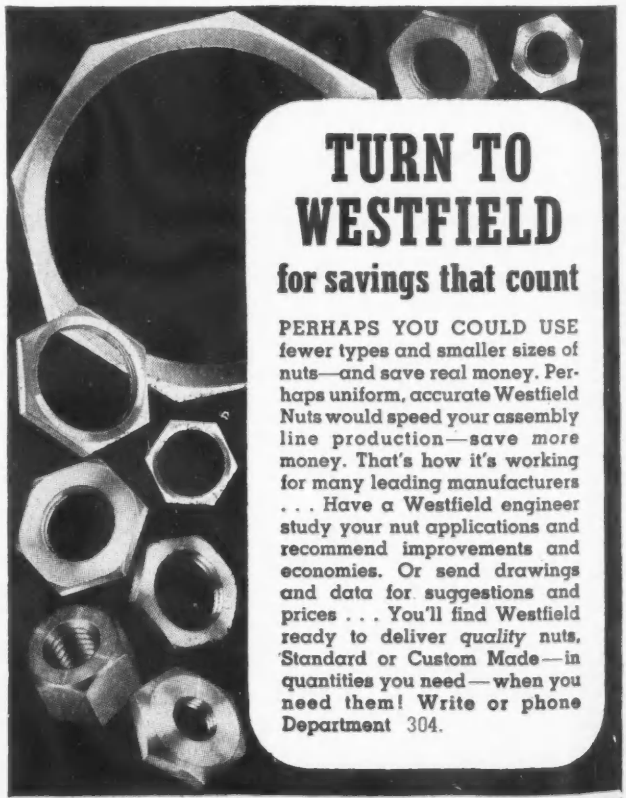
	September	August	Nine Months
Civil Aircraft—			
Personal Planes			
Number	590	700	6,248
Value	569	674	6,060
Transport Planes—	$2,683,630	$2,854,639	$25,582,222
Number	21	26	188
Value	$6,771,307	$7,014,927	$65,843,394
Aircraft Parts—Value	$1,871,511	$1,881,639	$17,103,301
All Other Products—Value	$2,243,491	$1,955,667	$23,055,922
Total—Value of Civil Aircraft, Parts and Other Products	$13,569,939	$13,706,872	$131,584,839

CIVIL AIRCRAFT ENGINES

	September	August	Nine Months
Civil Aircraft Engines—			
Number of Engines	447	660	8,334
Value of Engines	$1,877,993	$1,484,958	$26,721,945
Value of Engine Parts	$2,458,247	$1,990,784	$18,498,216
Value of All Other Products	$122,650	$173,649	$1,552,543
Total—Value of All Products of Civil Aircraft Engine Plants	$4,458,890	$3,649,391	$46,772,704

*—Bureau of the Census and Civil Aeronautics Administration.

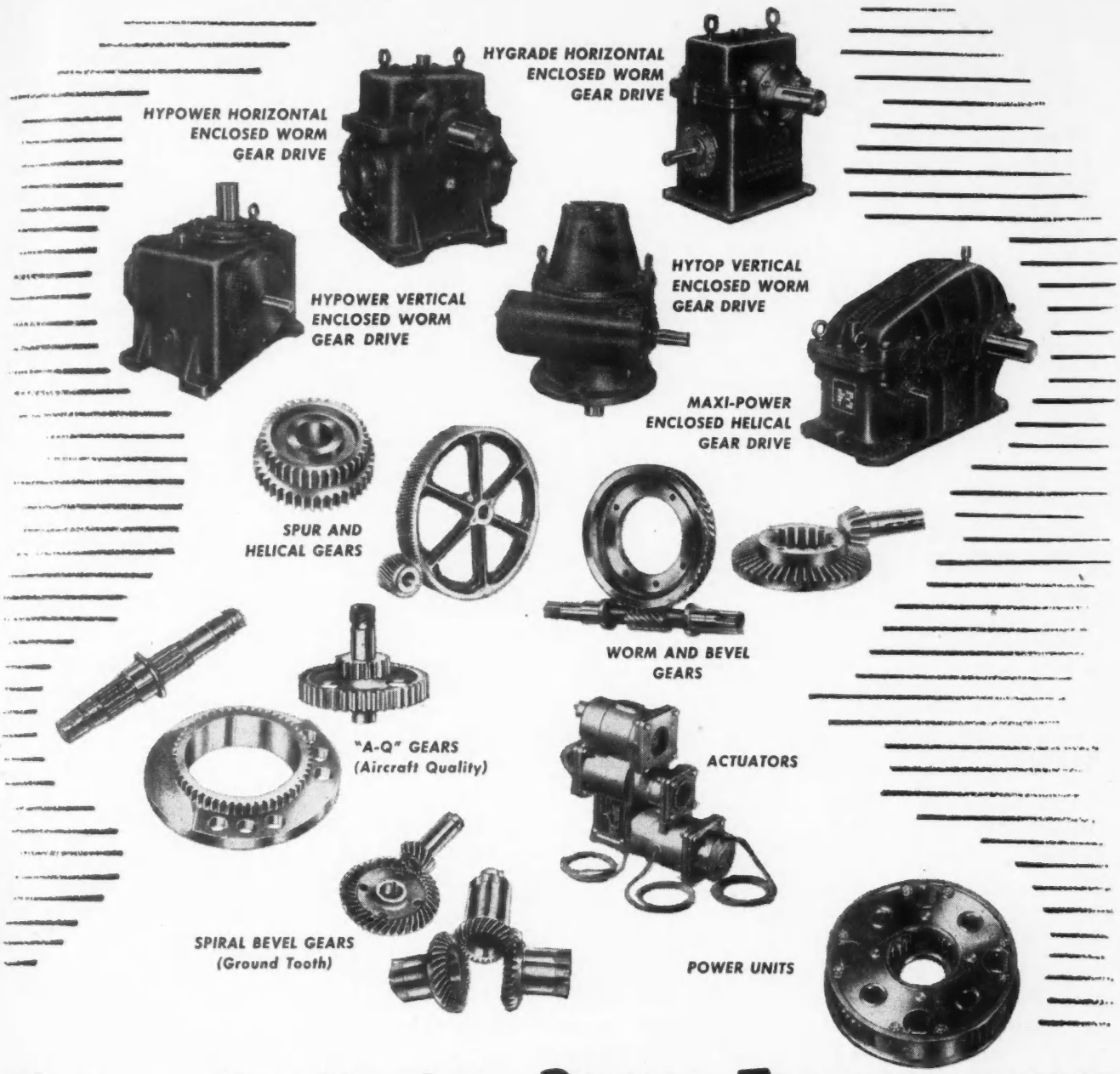
B U Y B O N D S



TURN TO WESTFIELD
for savings that count

PERHAPS YOU COULD USE fewer types and smaller sizes of nuts—and save real money. Perhaps uniform, accurate Westfield Nuts would speed your assembly line production—save *more* money. That's how it's working for many leading manufacturers . . . Have a Westfield engineer study your nut applications and recommend improvements and economies. Or send drawings and data for suggestions and prices . . . You'll find Westfield ready to deliver *quality* nuts, Standard or Custom Made—in quantities you need—when you need them! Write or phone Department 304.

WESTFIELD METAL PRODUCTS CO. INC.
WESTFIELD, MASS.


HYGRADE HORIZONTAL ENCLOSED WORM GEAR DRIVE
HYPOWER HORIZONTAL ENCLOSED WORM GEAR DRIVE
HYPOWER VERTICAL ENCLOSED WORM GEAR DRIVE
HYTOP VERTICAL ENCLOSED WORM GEAR DRIVE
MAXI-POWER ENCLOSED HELICAL GEAR DRIVE
SPUR AND HELICAL GEARS
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"A-Q" GEARS (Aircraft Quality)
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POWER UNITS

Whatever Your Needs in *POWER TRANSMISSION*

If the equipment you manufacture calls for high quality gears, Foote Bros. has facilities for producing helical, worm, spur, and bevel gears in practically any size and ratio.

If you need high precision gears possessing the advantages of light weight, compactness, extreme efficiency, and lower noise level—capable of transmitting loads at high speed—Foote Bros. "AQ" (Aircraft Quality) gears are the answer.

If you are looking for enclosed gear drives—worm or helical—Foote Bros. has a complete line in a wide variety of sizes and ratios. The new Hypower Worm Gear Drives and Maxi-Power Helical Gear Drives offer the latest engineering development.

If you require power units or actuators engineered to fit a confined space envelope, and designed to transmit or control power, Foote Bros. engineers will gladly work with you on the development of units to meet your specific requirements.

Foote Bros.' plants offer the latest equipment for producing of gears and enclosed gear drives—backed by almost a century of manufacturing experience.

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
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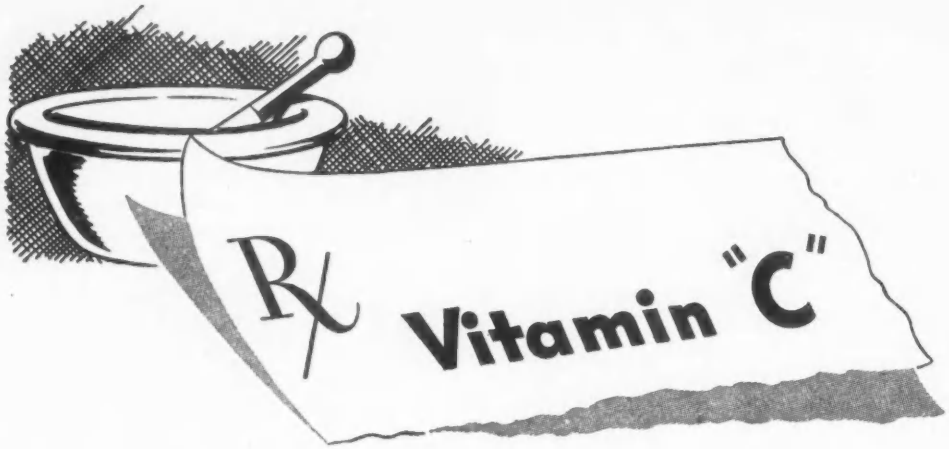


This prescription raised production 50%

Vitamin "C"?—Carboloy Cemented Carbide, of course.

It was a Carboloy engineer who turned the trick. Here's the story:

On installing a new boring machine recently, a small plant in Pennsylvania was sadly disappointed to get no better production from it than they had from the old one. So they called in a Carboloy engineer.

Now? Thanks to his suggestions, the new machine is turning out half again as many pieces—twelve cast-iron wheels an hour instead of the previous eight.

Why was he able to help them? Here's the reason: Carboloy engineers spend most of their time working with Carboloy Cemented Carbides. They've come up against almost every type of carbide problem you can imagine, in their time. They're experts—specialists in carbides.

Try this prescription yourself!

You, too, can back up the intimate knowledge of your own production men with this specialized "know-how" of Carboloy engineers. They can bring to your plant a broad experience in obtaining maximum results with carbides.

Slight changes in tool design, speeds or feeds, grinding, or tool handling often effect far reaching economies and increases in out-put.

Together, your engineers and our Carboloy specialists can form a team nothing can stop. Together they can use carbides to cure many of your production ills.

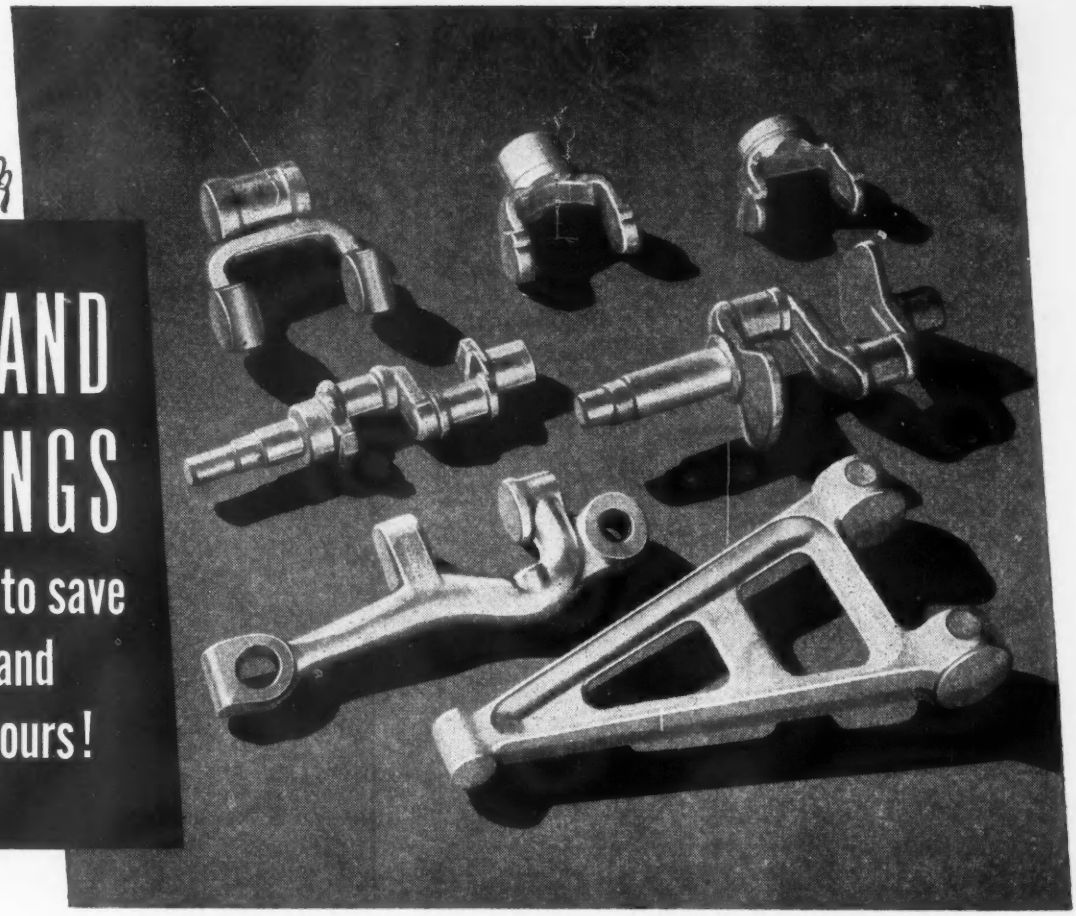
Ask for your Carboloy engineer

Your Carboloy engineer will be glad to help you with your carbide problems; or in the selection of the most economical tooling from any of Carboloy's 600 standard tools and blanks, or special Carboloy-tipped tools made by more than 150 tool manufacturers.

Why not call your Carboloy engineer? Or write us direct: Carboloy Company, Inc., 11151 E. 8 Mile Street, Detroit 32, Michigan.

Standards stocked by authorized distributors in 82 cities coast to coast.

CARBOLOY®
CEMENTED CARBIDE



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enable you to save vital man and machine hours!

You actually will find that you can save man and machine hours when you employ Herbrand forged parts in your products. You can, because of the close tolerance uniformity maintained in every Herbrand forging to reduce your machining and finishing operations.

It is for this reason that you will find the Herbrand "Diamond H" trade mark on the vital forged parts of many of today's leading automobiles and industrial equipment. This—and the fact that forgings bearing this trade mark are known for their inbuilt stamina and durability.

Whatever your requirements . . . upset or drop forgings . . . in any size or shape up to 200 lbs. . . in orders of thousands or millions . . . order from Herbrand and depend on the famous "Diamond H" trade mark.

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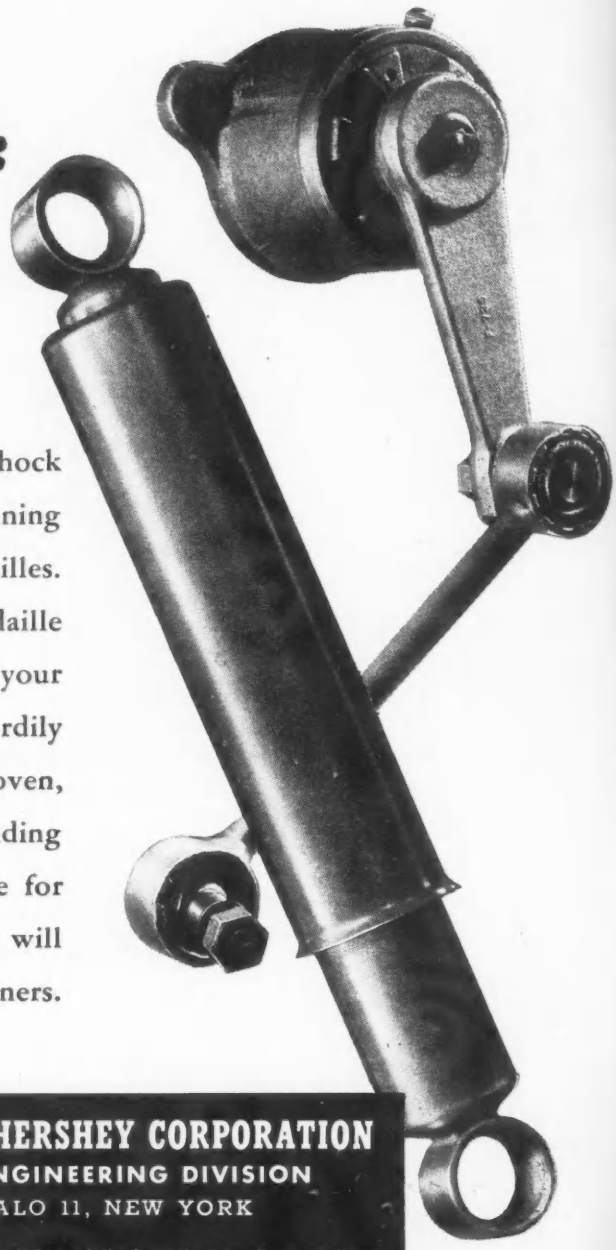
A GOOD BEGINNING

FOR A HAPPY ENDING...

Houdailles*



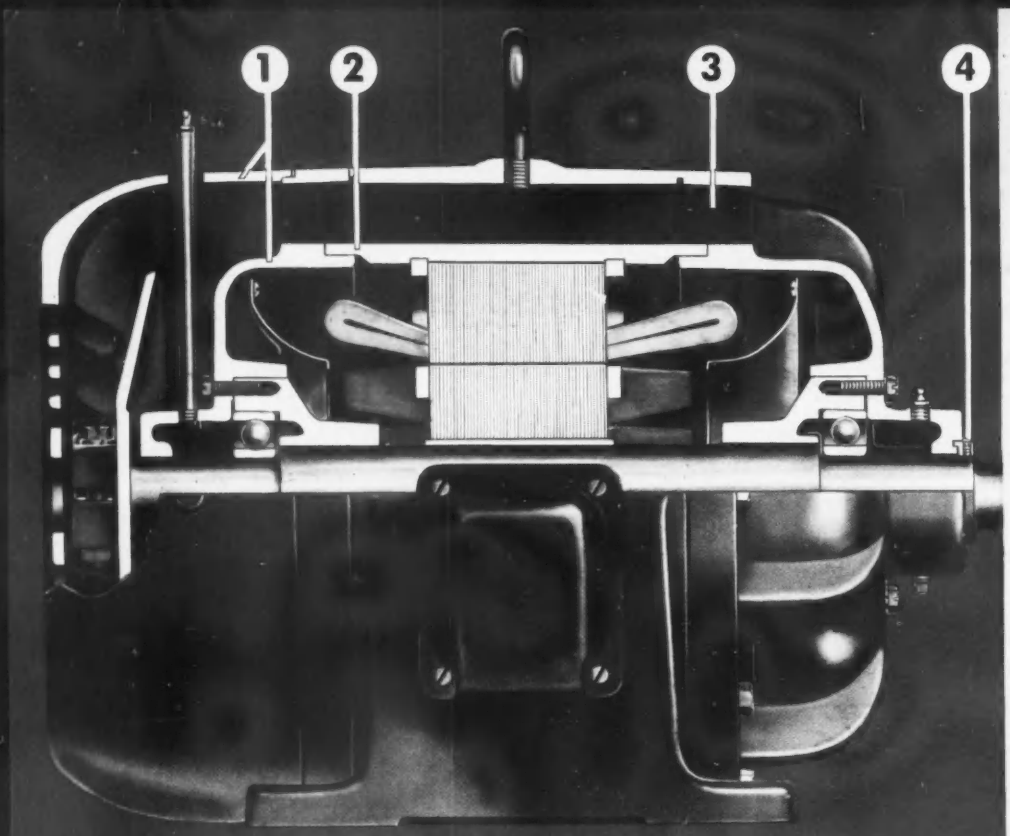
● Ride engineering begins with shock absorbers. And there's no better beginning for any car manufacturer than Houdailles. Whether you use Houdaille Rotary or Houdaille Direct Acting Units, you will be building your ride around soundly engineered, sturdily constructed, completely proven, *precision* instruments. The happy ending will come in the better ride for more miles which they will give your owners.

*Say: "Hoo-Dye"

HOUDAILLE-HERSHEY CORPORATION
HOUDE ENGINEERING DIVISION
BUFFALO 11, NEW YORK

America's Pioneer Builder of Hydraulic Shock Absorbers

YOU CAN PUT A
TRI CLAD
REG. U.S. PAT. OFF.
MOTOR ANYWHERE
GENERAL ELECTRIC
HERE'S



The standard totally enclosed Tri-Clad features a *cast-iron* double-wall structure (1) that keeps outside air from electrical operating parts . . . machined-fit end shields (2) . . . large air passages (3), easy to clean . . . rotating labyrinth seals (4) that keep foreign matter from working in around the shaft. Note, too, the new corrosion-resistant G-E Textolite cooling fan is now standard on all 1- to 15 hp TEFC Tri-Clads.

You can put a TRI CLAD motor anywhere

YES SIR! The standard *Tri-Clad* open motor is a *cast-iron, dripproof* motor you can put anywhere that *any* open motor can be used—and in a lot of places where other open motors couldn't take it.

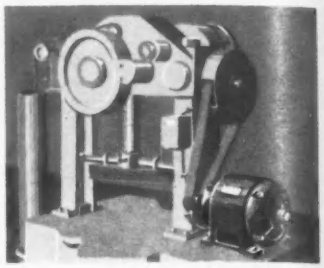
What's more, for the really dirty jobs—where air is laden with dust, or corrosive fumes—where metal chips and cutting fluids abound—the Tri-Clad totally enclosed motor gives you more protection, *inside and out,* than any other make of motor you can buy.

1,720,000 Tri-Clad motors, operating in every conceivable kind of plant, prove the far-reaching advantages of cast-iron construction . . . superior resistance to corrosion . . . rigidity that makes for permanent shaft alignment . . . inherent damping action that minimizes noise and damaging vibration. These motors prove, too, that Tri-Clad double-end ventilation simply has no equal for prolonging an open motor's useful life. Providing high-volume, relatively low-velocity cooling, this ventilating system keeps Tri-Clad motors *uniformly* "air-conditioned".

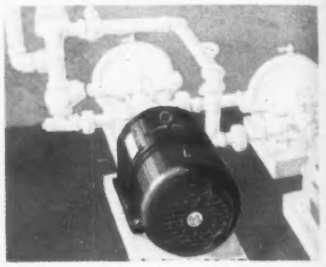
WANT MOTORS THAT CAN REALLY TAKE ABUSE? Tri-Clad motors in nearly all types and ratings are available for **IMMEDIATE SHIPMENT.** Contact your nearest G-E Office or write *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

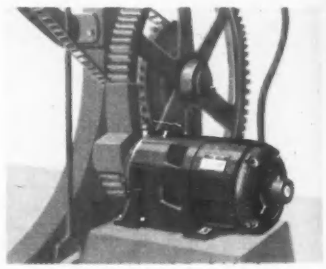
There's a Tri-Clad motor for every industrial need!



G-E open (dripproof) induction motors for constant-load, constant-speed applications. From 1 to 2000 hp.



G-E totally enclosed motors for outdoor operation, in abrasive dusts, or corrosive fumes. From 1 to 1000 hp.



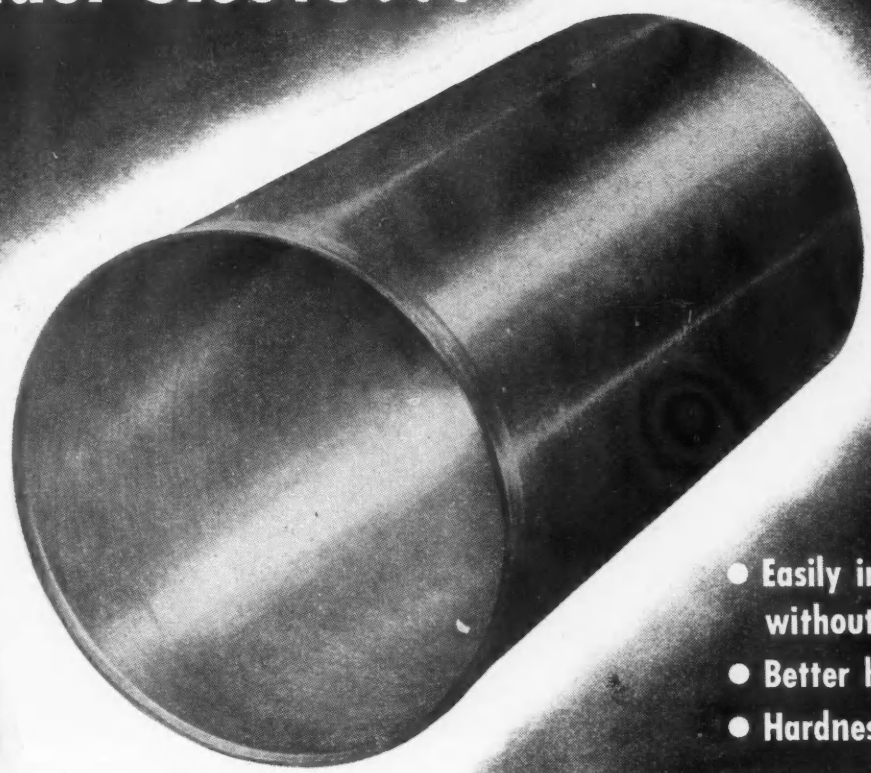
G-E gear-motors for low-speed operation. A normal-speed motor with built-in reduction gear. From ⅛ to 75 hp.

G-E synchronous motors for maintaining exact speeds or for correcting power factor. From 20 to 1000 hp.

YOU CAN'T BEAT TRI CLAD

EXTRA PROTECTION

The new Thompson *Copper-coated* Cylinder Sleeve . . .



- Easily installed — without distortion
- Better heat conductivity
- Hardness 500 Brinell

CONVENTIONAL CYLINDER SLEEVES are often distorted during installation because of the tight press fit they require. Even with great care and skill this distortion often occurs.

To remedy this situation and gain other important advantages, Thompson Products now offers a new COPPER-COATED cylinder sleeve.

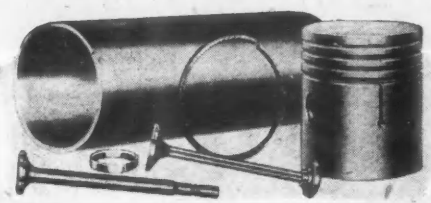
The soft copper coating on the outside surface yields readily when the sleeve is press-fitted. This greatly reduces the danger of distortion.

For the same reason the copper "fills in" any irregularities in the contours of the fit, assuring contact of the sleeve and block at all points. This means better and more uniform conductivity of heat from the cylinder to the cooling system.

The bearing surface of this new sleeve has a deep hardness of 500 Brinell for longer wear in heavy-duty service.

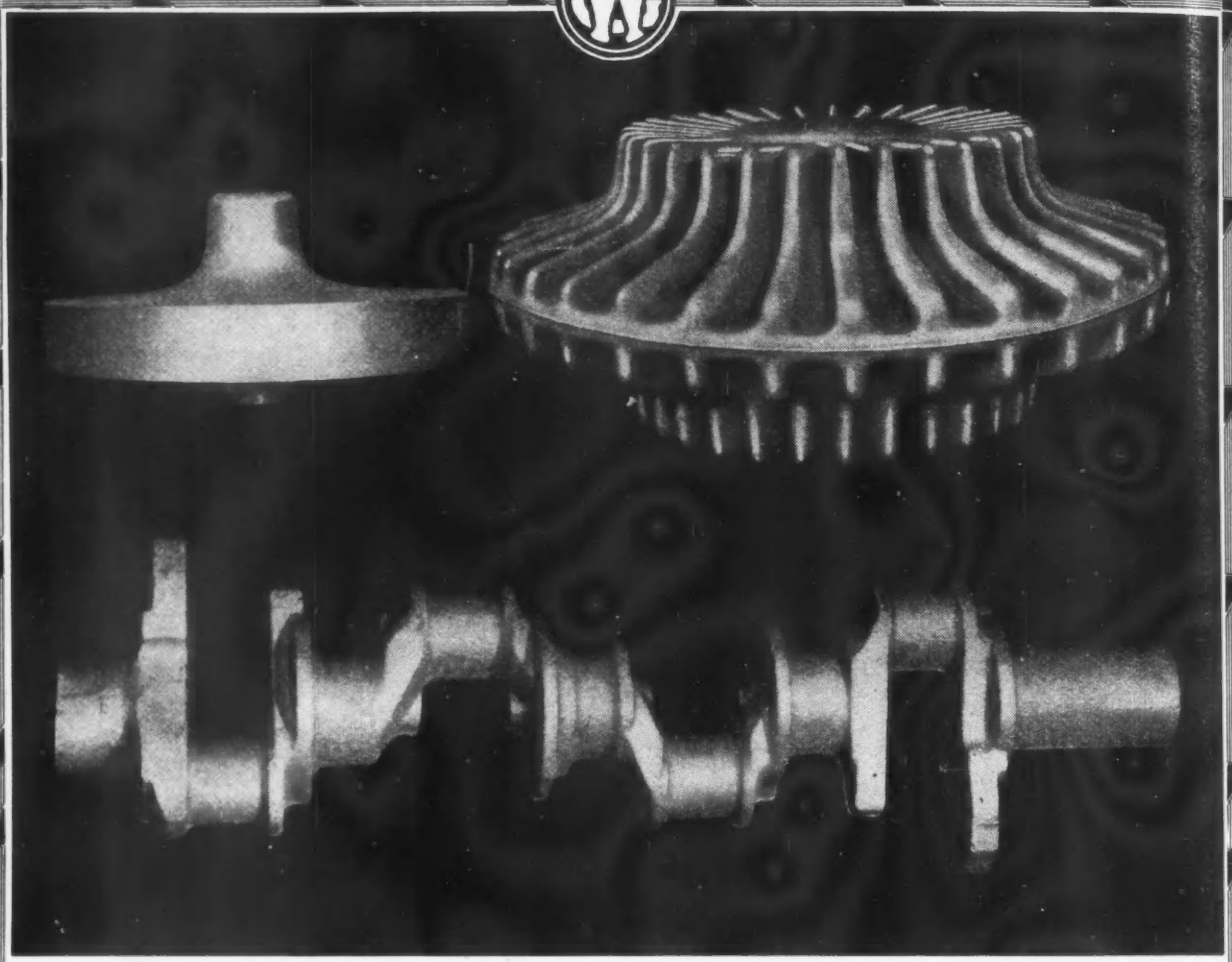
Thompson Products is one of the largest producers of wet and dry cylinder sleeves for original equipment and replacement use in all types of engines, automotive and industrial. These sleeves are part of a complete line of engine and chassis parts engineered for durability and economical service.

Thompson improvements in precision parts engineering include Steel-Belted Pistons, U-Flex Oil Control Rings, Cylinder Sleeves, Valve Seat Inserts, Sodium-Cooled Valves, Valve Rotocaps.



Thompson Products

CLEVELAND • DETROIT • LOS ANGELES • ST. CATHARINES, ONTARIO



Wyman-Gordon—specialists in the vital forgings of the internal combustion engine since its inception—is today the largest producer of crankshafts for the automotive industry and of all types of forgings for the aircraft industry.

Be it crankshafts and other vital forgings for the piston type engines or turbine wheels and impellers for turbo jets—there is no substitute for Wyman-Gordon experience.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

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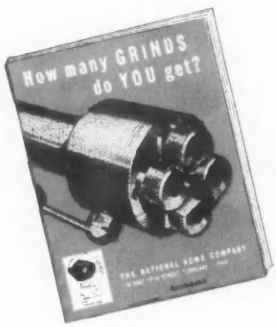
AVAILABLE FOR PROMPT DELIVERY*

Namco Style DR Revolving Head Vers-O-Tool equipped with the new adjustable blade chasers—economical for short-run thread-cutting.

Namco Style DR Revolving Head Vers-O-Tool equipped with the famous circular chasers (interchangeable with adjustable blade chasers)—ideal for long-run thread-cutting.

These Cost-Cutting Namco Vers-O-Tool Twins



JUST OFF THE PRESS—This interesting, illustrated 24-page booklet describes the advantages of Vers-O-Tool adjustable blade chasers, circular chasers and hollow mill cutters. Ask for Bulletin D-48-A.

For thread-cutting at its economical best you can count on Vers-O-Tools—*available now.*

Either the new, lower-priced adjustable blade chasers, or the famous circular chasers can be put to work cutting costs in *your* shop—and both are interchangeable on the same Vers-O-Tool head, whether you use the stationary, revolving or Brown and Sharpe type. With this exclusive Namco combination you can cover the entire production range for a given size—with only a fraction of the usual tool investment.

May we show you figures on how this versatile Vers-O-Tool team can cut your threading costs?

***Also 24-hour deliveries on standard stockable NC and NF chasers and blocks**

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Acme • Gridley 4 • 6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

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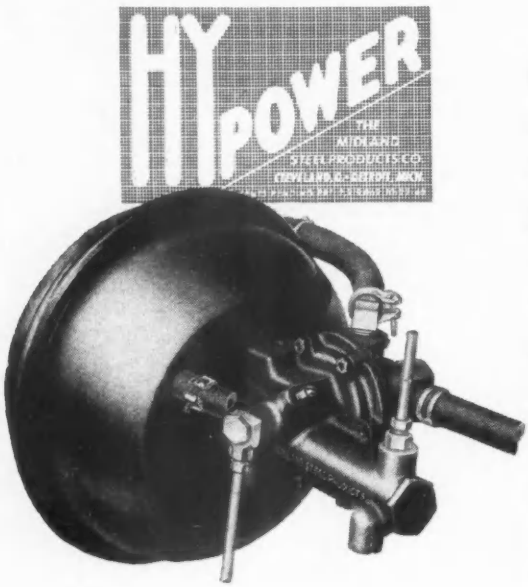
for the BEST BRAKES for YOUR JOB



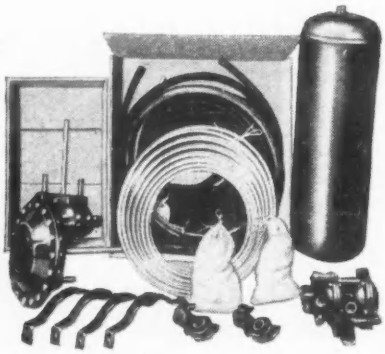
HY-POWER — Powerful, efficient, economical! . . . Self contained—sealed against all atmospheric conditions. . . . Never needs lubrication.

AIR BRAKE KITS — With the most efficient compressor. . . . Governor an integral part of compressor. . . . Tremendous reserve power.

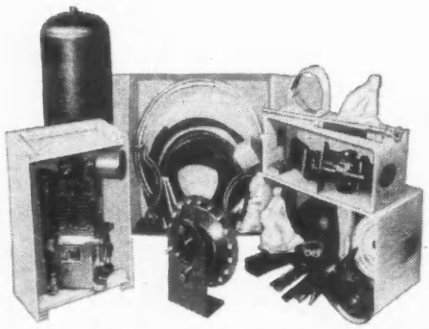
VACUUM BRAKE KITS — With exclusive compensating control valve—permitting any degree of brake application, with corresponding "brake feel." . . . Power to stop the heaviest loads easily and safely.

All Midland Power Brakes are backed by Midland's famous "Factory Rebuilt Exchange Plan."

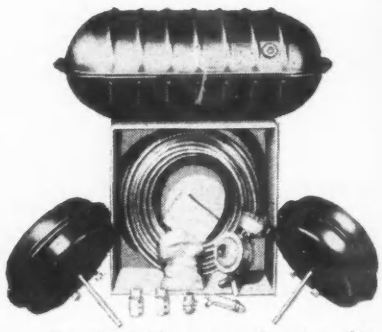
See your Midland distributor, or write to us for complete information.



Trailer Air Brake Kit



Complete Air Brake Kit—Truck or Tractor



Trailer Vacuum Brake Kit

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CARBURETORS—

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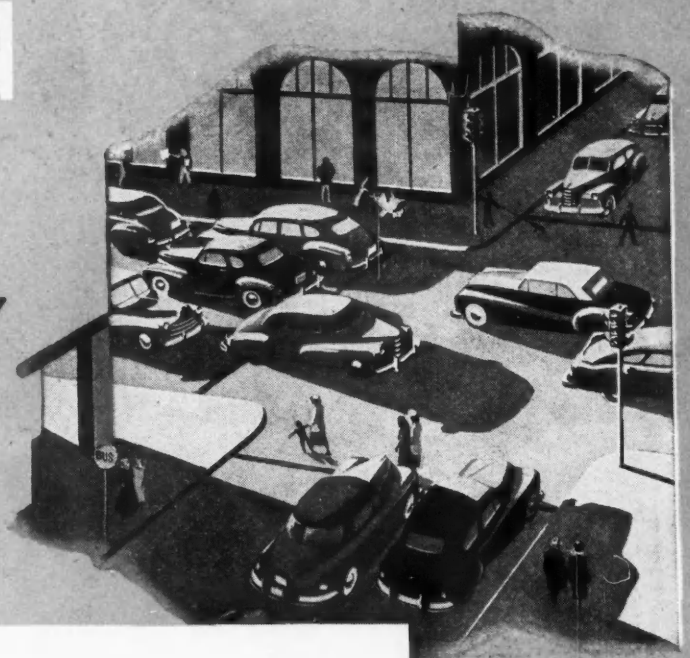

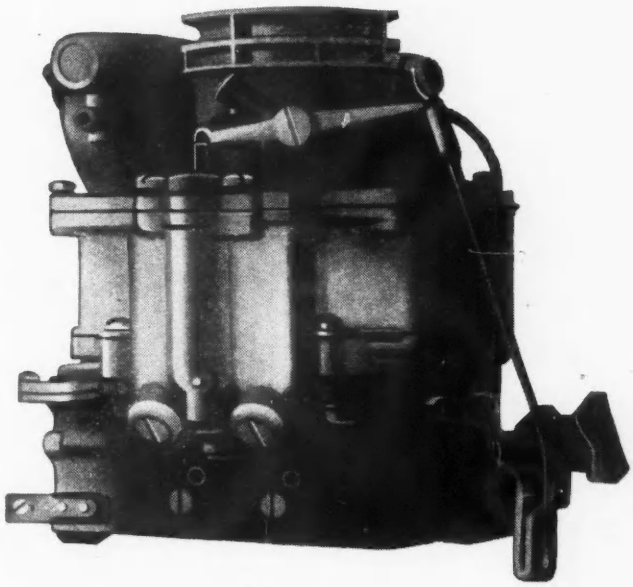

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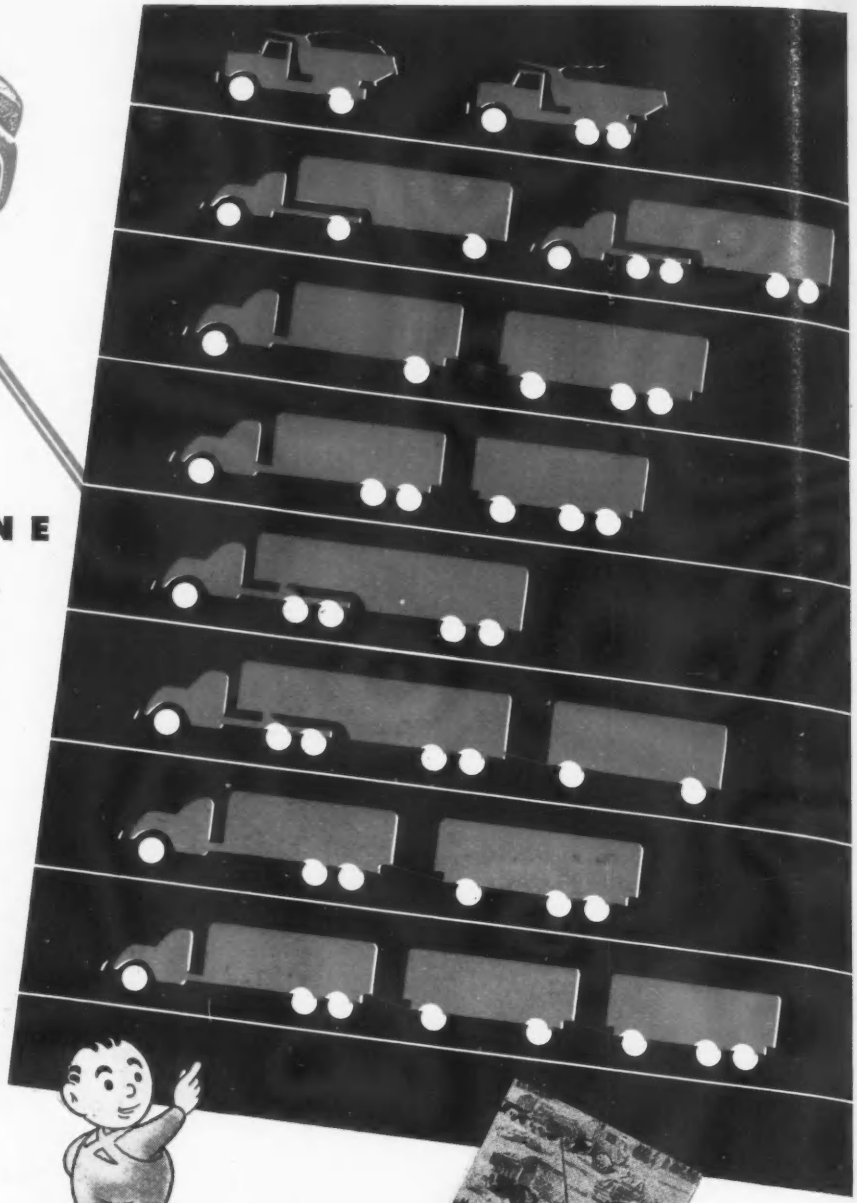
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. . . a complete line of unit-mounted, amidship and auxiliary transmissions . . . more than 40 compact models for heavy-duty trucks of all weights, sizes and types.

This "Fuller" line of transmissions is kept complete by the constant addition of new units developed for newer, more powerful engines . . . for ever-changing road and load conditions. Fuller Transmissions make possible the heavy loads and fast schedules which characterize today's on and off-highway operations.

Write for the catalog which describes each of these proved-in-the-field Fuller Transmissions . . . geared for your truck, for your engine and axle, for your particular operating condition.

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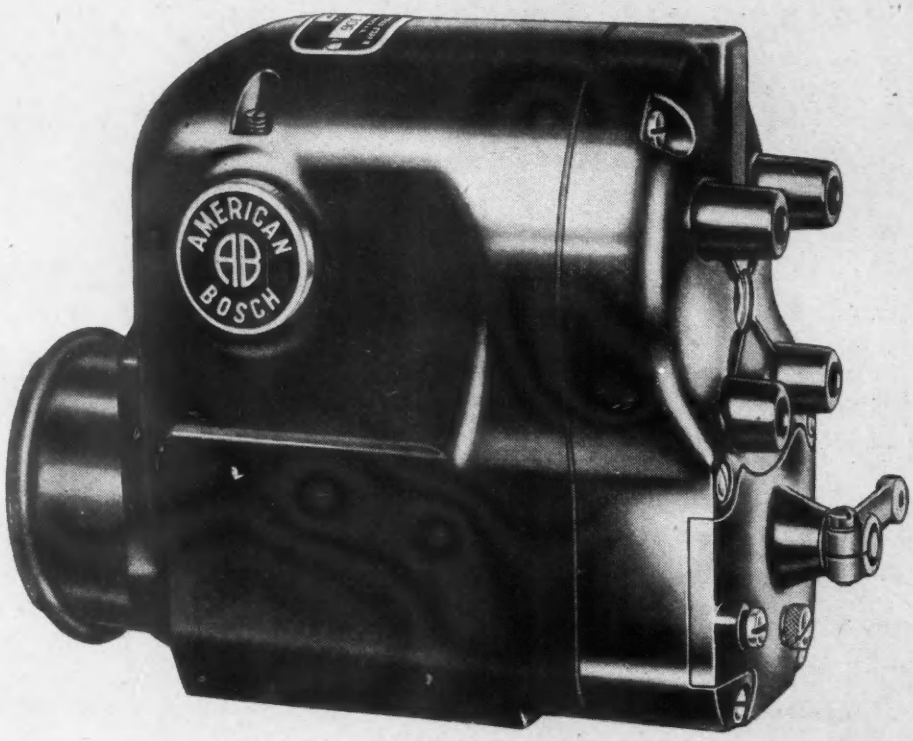
For PREMIUM PERFORMANCE



American Bosch *super-powered* magnetos pay big dividends in quicker, easier starting . . . long years of smooth, trouble-free operation.

For these famous products of American Bosch electrical research incorporate the latest technical developments. They are ruggedly built to the highest precision standards.

Offered as original equipment by many leading engine makers, American Bosch *super-powered* magnetos are also available for replacement in sizes to fit practically every type of farm and industrial engine.

For the name and address of your nearest American Bosch authorized Service Station or Distributor, write for free directory.

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Glass-Run Window Channel and Contour Weatherstrip

For over fifteen years STEECHAN channel and weatherstrip has been standard equipment on the finest motor vehicles the world over. Manufacturers know that STEECHAN is dependable insurance that their claims of the ultimate in quality and durability will not be challenged because of the failure of these important parts hidden from the eye of the purchaser.

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BUSINESS IN MOTION

To our Colleagues in American Business . . .

Are you using your supplier's brains, as well as his materials? It will pay you to do so. Let us give you three examples that will show you what we mean. First, there was the Revere customer who was found to have in his shop a hand-soldering operation costing about 2¢ per unit. We suggested a spot-welding machine which cut the cost to a fraction, and did a better job.

In another case, spot welding was impractical because of the nature of the materials, and soldering was inevitable. Here Revere recommended portable induction soldering equipment. This proved to be so effective in lowering costs that we have since brought it to the attention of other customers using hand-soldering methods.

The question of rod versus strip is another subject of great interest in these days of endless search for better and faster methods. In our experience, quite often a part can be made from strip just as well as from rod, and at much lower cost. For instance, one of the Revere customers was making a knob escutcheon and bushing in a screw machine, turning out 150,000 pieces per month. He was using large quantities of bronze rod. It was pointed out to him that the part could be produced just as well by an eyelet machine using bronze strip, substantially reducing every cost element, and resulting in a product of equal appearance and serviceability.

These are but three of many instances of special service given by Revere. You will note that the essential factor and common element in each case was the willingness of the customer to provide complete information about methods and end uses. Only this made it possible for us to collaborate with our friends in the successful search for cost-reducing materials or processes.

Revere is by no means the only company accustomed to work in this way with its customers and prospects. Every important supplier in the country is fully informed about his materials, whether they be solids or fluids, organic or inorganic. We suggest that no matter what you make, or how, it will pay you to give your suppliers the privilege of collaboration.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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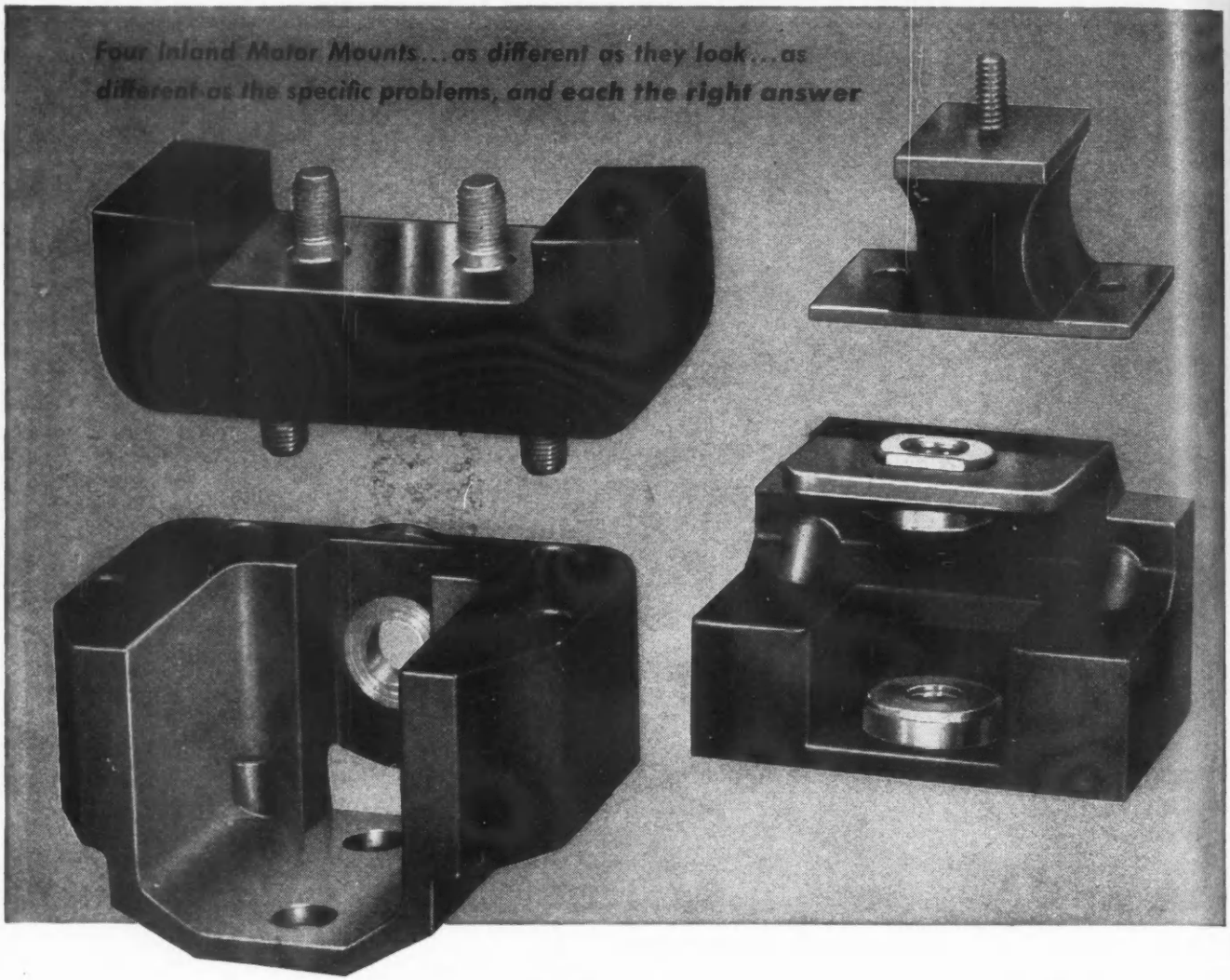
Executive Offices:

230 Park Avenue, New York 17, N. Y.



Custom-Tailored Engineering—plus Faster Assembly at Lower Cost

You can't buy an Inland Motor Mount from a catalog. That's because Inland engineers know that each motor-mount problem demands a specific and individual answer—its own solution.

How to produce the correct dampening rate, controlled frequency, controlled dynamic rate? These questions have different answers for each installation. Inland, pioneer in motor-mount research and development, has always designed the *particular* mount for the *particular* application and service.

Unequalled "know how" in the bonding of rubber to metal — and in the special properties of a wide range of synthetics which combat oil, water, wear and heat or cold. The most up-to-date equipment for fabricating and testing. Constant laboratory control for the finest quality during production.

And this too! Inland Motor Mounts are designed and built specially not only for superb service, *but for faster assembly at lower cost.* A triumph in both engineering and production!

INLAND MANUFACTURING DIV.
General Motors Corporation, Dayton, Ohio

Motor Mounts by INLAND MANUFACTURING

RUBBER • METAL • PLASTIC PRODUCTS

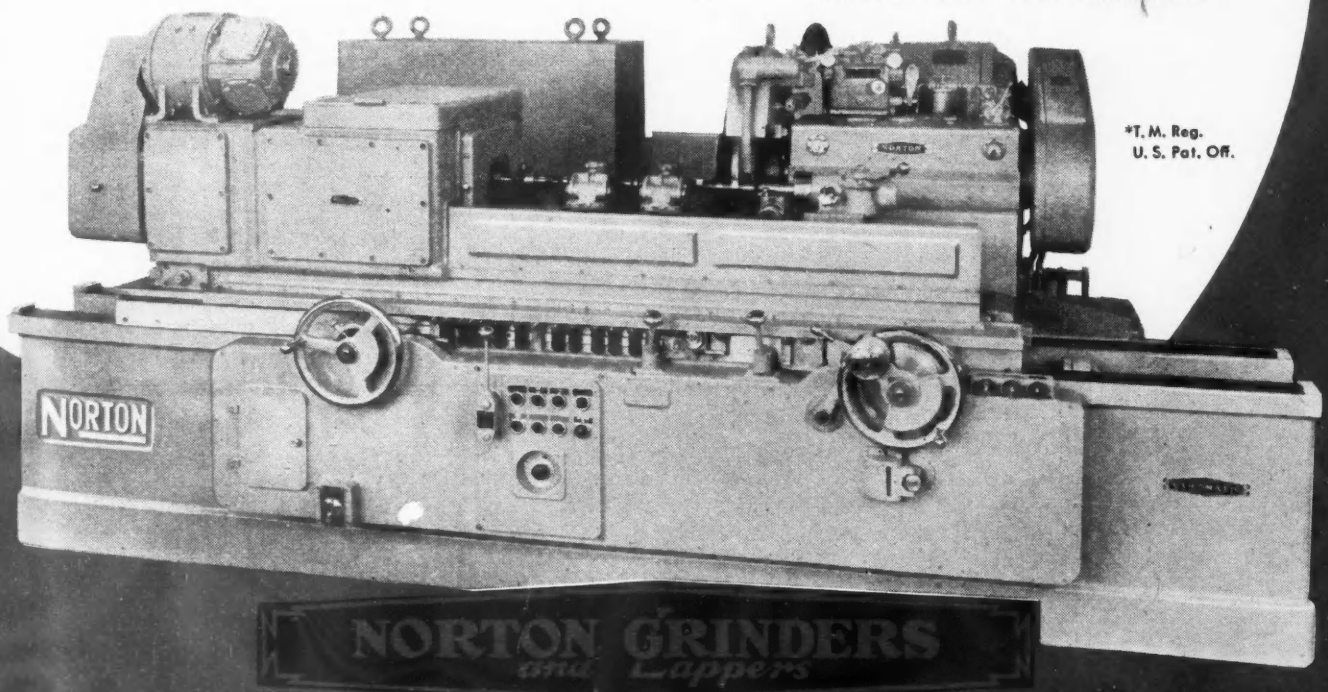
The new NORTON CAM-O-MATIC* Cam Grinder

A MACHINE THAT YOU'LL *LIKE* ON YOUR PRODUCTION LINE

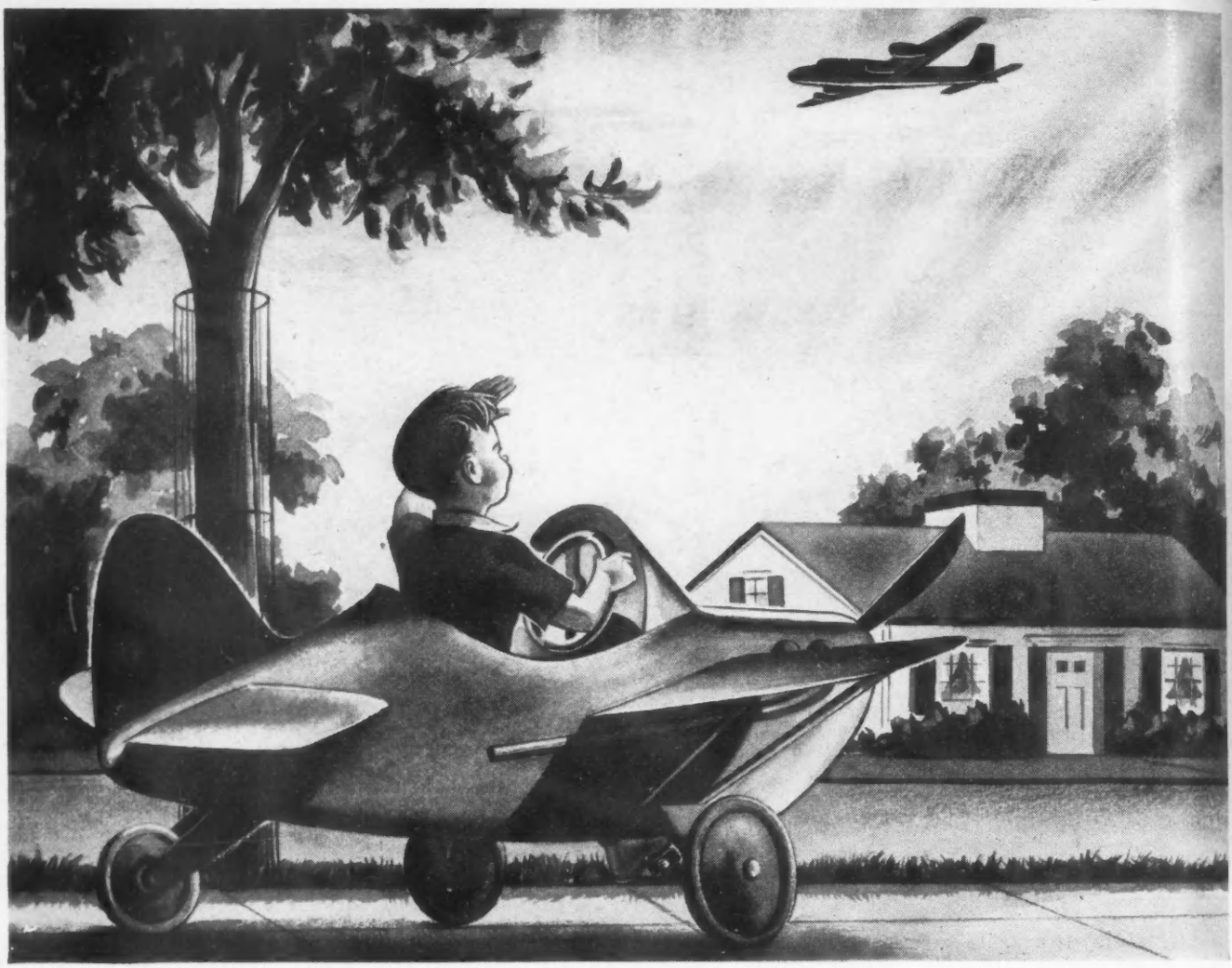
You'll get better finish, better form, and more production from this *completely new* Norton CAM-O-MATIC* Grinder. Yes, you'll get a finer product *faster*—and you'll also get these preeminent Norton CAM-O-MATIC features:

- **Automatically compensating work speed**
- **The famous NORTON wheel spindle unit with bearings $3\frac{1}{2}$ x $8\frac{5}{16}$" and $3\frac{1}{4}$ x $7\frac{1}{8}$"—over 50% support of spindle body**
- **Simplicity of operation that permits the tending of more than one machine**
- **Steel "ribbon-type" baseway guards**
- **Hinged type wheel guard**
- **Convenient coolant clean-out ramp**
- **Pumps and motors outside of base**
- **Close grouping of electrical and hydraulic controls**

Norton 5" x 30" No. 2 Cam-O-Matic Grinder



*T. M. Reg.
U. S. Pat. Off.



Spongex is flying with them both!

From toy airplane tires to dozens of places in the biggest airliner, *Spongex* sponge rubber is making life smoother, easier and quieter for everyone.

In homes and offices — factories and public buildings — in land, sea or air travel — wherever you go, whatever you do today, your path is made pleasanter by *Spongex* as an integral part of more and more widely varied products.

Spongex is used for airplane window seals, transportation seat cushions and backs, motor suspension pads, ejectors for die cutting, anti-rattlers and anti-squeak pads, all kinds of seals and gaskets, weather-stripping — an almost infinite number of things, and increasing every day.

Made by a company which has specialized for 25 years in the production of cellular rubber products, *Spongex* is an amazingly versatile material that is being used by leading manufacturers to solve problems of cushioning, insulating, sealing, dust-proofing, gasketing, shock absorption, and for sound and vibration elimination.

Give this unique material serious consideration when planning improvement of your present products or developing new ones for the future. Samples of *Spongex* are available on request for experimental purposes. Write Sponge Rubber Products Co., 101 Derby Place, Shelton, Conn. Sales offices in principal industrial centers.

SRP Trade Marks Reg. U.S. Pat. Off.

SPONGE RUBBER PRODUCTS CO.

SPONGEX • CELL-TITE • TEXFOAM • TEXLITE • TEXLOCK

"Tubing?...Yes, I know where we can get it

"In *our* business we can't afford to get caught short. Constant market changes, unstable conditions, and our large volume requirements compel us to keep tab on a lot of suppliers—both actual and potential.

"So when the Chief asked about tubing, I was able to pop right back, 'Sure, I know where we can get it.' I knew that we could send steel to Nikoh and get quick service on the big quantities of tubing we need."

NIKOH **for welded steel tubing, pipe, conduit**

NIKOH TUBE COMPANY • 5001 South Kedzie Ave., Chicago 32, Ill.

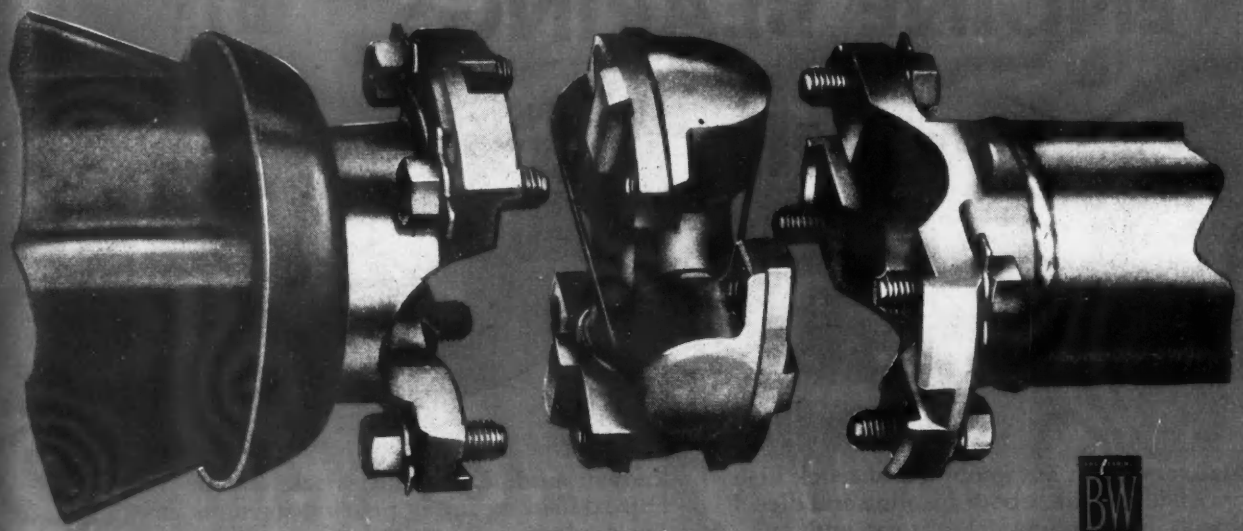
NIKOH

1. Electrical Industry
2. Process Industries
3. Furniture & Fixtures
4. Toys & wheel goods
5. Heating, ventilating, air conditioning
6. Machinery, metalworking
7. Railroad, marine
8. Refrigeration
9. Petroleum
10. Automotive, aviation

Nikoh has plant capacity available for fabricating welded steel tubing (½″ to 4″ OD), pipe (¾″ to 6″ ID), and conduit (½″ to 2″). Formed and welded with efficient new equipment that assures uniform quality, accuracy to specifications, prompt shipments, and moderate price. Consult Nikoh on your problems of engineering and production.

NIKOH TUBE COMPANY 5001 S. KEDZIE AVE., CHICAGO 32, ILL

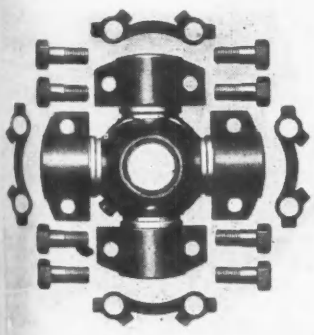
TWENTY MINUTE SERVICING-With



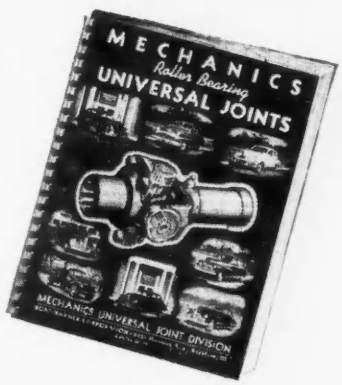
MECHANICS

Roller Bearing UNIVERSAL JOINTS

For Cars — Trucks — Busses and Industrial Equipment



MECHANICS Roller Bearing UNIVERSAL JOINTS can be removed and replaced — on the road — in 20 minutes — with a wrench and hammer — without disturbing the drive shaft's original accurate balance and alignment. The center cross-and-bearing assembly has bearings tied together with a welded wire — which does not have to be removed when the assembly is installed. An extra cross-and-bearing assembly can be carried in the tool box — ready for emergencies — completely sealed against dirt and moisture.



MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Ave., Rockford, Ill.

DUREX-100 ENGINE BEARINGS Stand the Gaff

Actual service in automobile and truck high compression engines, both gasoline and diesel —as well as exacting laboratory and engineering road tests—shows conclusively that Durex-100 bearings have an unmatched life expectancy.

To produce more durable engine connecting rod and main bearings, Moraine Products applies the broad practical experience gained as a leading manufacturer of metal powder parts for industry, as well as a producer of automotive parts and products. By developing a porous metal powder substructure for the Durex-100, Moraine engineers have overcome the bugaboo of conventional bi-metal bearings—early fatigue failure.

Through the combination of a special high lead base babbitt alloy with this sintered matrix, Durex-100 bearings afford unprecedented advantages in high conformability, high embedability, greater resistance to fatigue cracking, high resistance to corrosion, and a high melting point.

As original equipment in Cadillac, Buick, Oldsmobile, GMC Trucks and other well-known automobile and truck engines, the Durex-100 bearing is proving its superiority for modern high compression engine application.

Moraine Products invites inquiries regarding the advantages of Durex-100 bearings for the engines you manufacture.

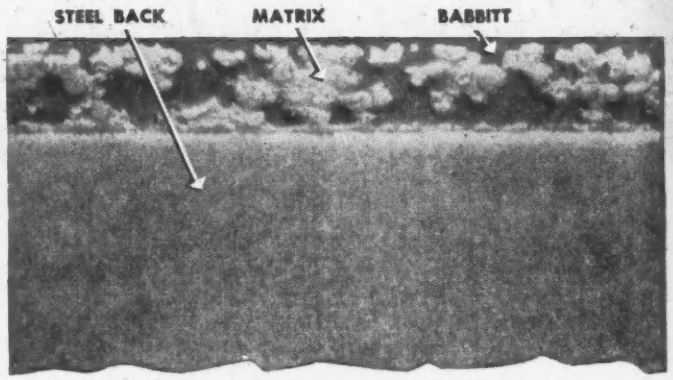


PHOTO-MICROGRAPH OF CROSS SECTION OF DUREX-100 BEARING. MAGNIFIED 33 TIMES

THE MATRIX MAKES THE DIFFERENCE

Steel-backed intermediate matrix of porous copper-nickel bonds mechanically, as well as metallurgically, with thin high lead babbitt overlay.

MORAINE PRODUCTS

Division of **GENERAL MOTORS** DAYTON, OHIO

DUREX-100 ENGINE BEARINGS . . . BY MORAINE

"Pays Off" In Extra Days of Wear

REEVES ARMY TWILL

New Uniform Designs by Helen Cookman—Pat. App. for.

THERE'S A PAYDAY every day in uniforms made of Reeves Army Twill. This high quality fabric means real economy through extra days of wear at work... through repeated washings at home or at the laundry.

Reeves Army Twill has a high tensile strength and comes in a wide range of vat-dyed colors fast to sun, water and perspiration. And being Sanforized, residual shrinkage is less than 1%. It tailors beautifully for extra comfort and added good looks—two important assets for employee morale and customer good will.

Remember—over 100 million yards of this same fabric helped equip America's fighting men—exceeded Government specifications under the toughest conditions.

"FROM COTTON TO CUTTER"

THE REEVES FABRIC GROUP INCLUDES: Reeves Army Twill · Reeveking Gabardine · Glengarrie Poplin Marine Herringbone · Byrd Cloth · Warrior Twill Mountain Cloth · Pima King Broadcloth · Chesnee Gabardine · Reevecord · Parklyn Pique · Reeveweave

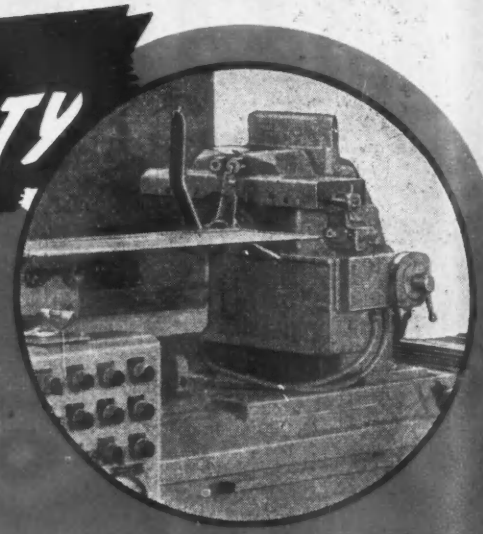
MADE OF FINE COTTONS

REEVES BROTHERS, INC. 54 WORTH STREET, NEW YORK 13, N. Y.

REPRESENTATIVES IN: *Akron · Atlanta · Boston · Chicago · Dallas · Los Angeles · Philadelphia · Portland, Oregon · St. Louis · Montreal · Toronto*

Another New GEARGRIND

with Greater LENGTH CAPACITY



TYPE GG-10 x 48A WITH AUTOMATIC WHEEL FEED

This is a combination spline and gear grinding machine, handling both involute and square key splines and work up to 48" long. The illustration shows it equipped with the Geargrind spline trueing device. The wheel trueing device for use with gears is shown in the insert.

If you have work within the capacity range shown below, write for complete specifications and catalog.

CAPACITY:

Takes between centers	Up to 48"
Gear diameter	¾" R.D. to 10" O.D.
Maximum swing	12½"
Number of teeth	4 to 120
Face width	Up to 34"
Diametral pitch	32 to 4

(For other diametral pitch requirements, consult our engineering department)

FORMED WHEEL GRINDING

There is no "distortion from heat treat" when you use the Formed Wheel Method of grinding external and internal gears, external and internal involute splines, straight splines, serrations and racks.

Geargrind Machines—in many styles and capacities—insure accuracy, fine finish and speed in production.

Catalog on Request

The GEAR GRINDING MACHINE COMPANY

TRANSMISSIONS
ACCESSORIES
CYLINDER HEADS
BUSHINGS, BEARINGS
Permanent-mold-cast bushings of Alcoa Aluminum are made to close tolerances, require less high-cost finishing; provide long service with over-all economy.

REDUCE YOUR CAR'S WEIGHT

with Permanent-Mold Castings of ALCOA ALUMINUM

Without making changes that might slow your production line, you can utilize aluminum castings by Alcoa to reduce the over-all weight of your car—and in many cases improve its performance and economy.

Permanent-mold castings of Alcoa Aluminum are made to close tolerances, require less high-cost finishing; are lighter, easier to handle.

As bearings and bushings, Alcoa Aluminum parts are bearing metal all the way through, provide long service with over-all economy.

Corrosion resistant, Alcoa Aluminum requires no painting.

For a better car, without costly changes, specify Alcoa Permanent-Mold Castings. Your local Alcoa sales office will be glad to quote. ALUMINUM COMPANY OF AMERICA, 2110 Gulf Building, Pittsburgh 19, Penna.

ALCOA FIRST IN ALUMINUM

ALCOA ALUMINUM 1888 1948 60 YEARS OF SERVICE

NOT A CLAIM . . .
BUT A PROVEN FACT

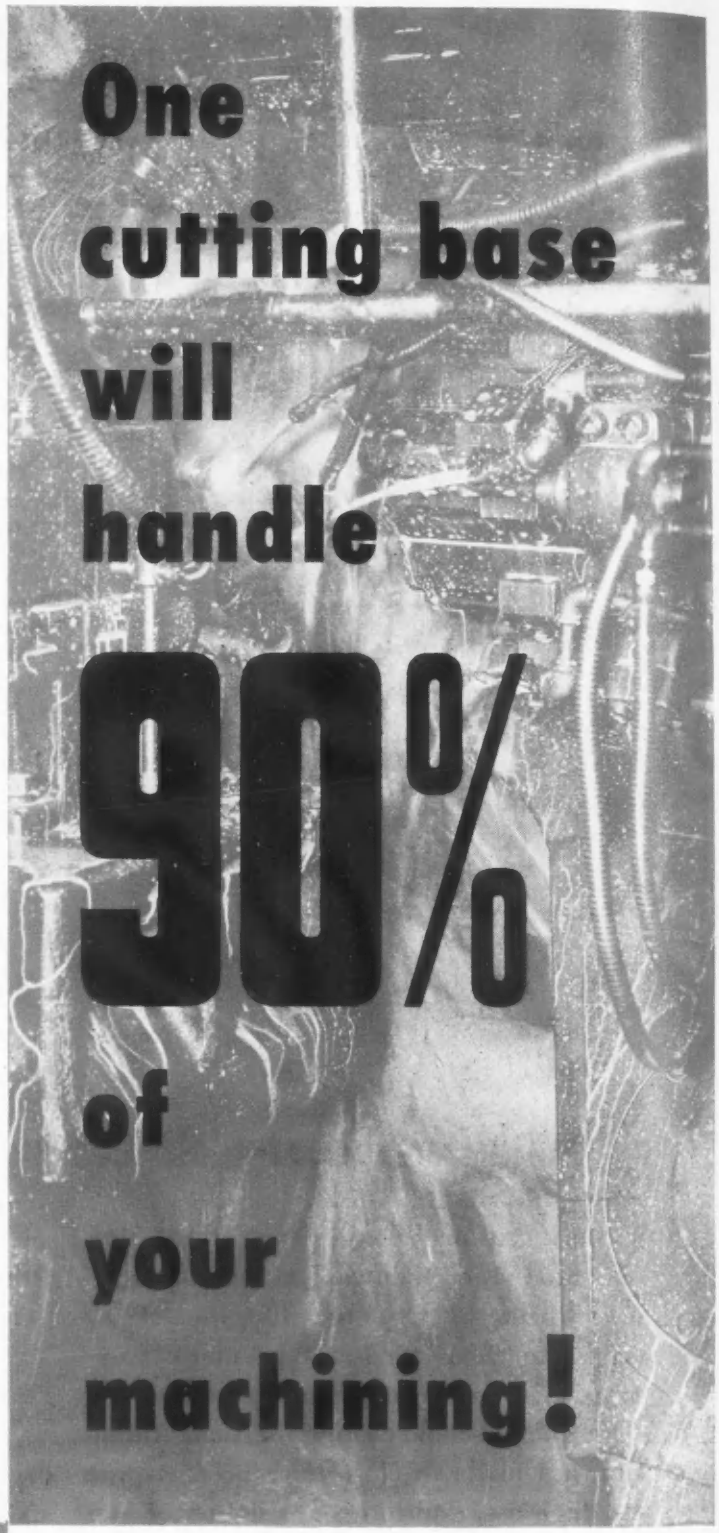
A few short months ago Houghton announced the "biggest news in cutting coolants since 1915."

It was Antisep All-Purpose Base—possessing all the qualities of all the good cutting fluids you've ever used—a hundred oils wrapped up in one!

It's easy for us to be enthusiastic about this cutting base, because we've watched it spread from one operation to another in a goodly proportion of the country's largest and fussiest machine shops. They try it on one or two machines, and before you can say "Antisep All-Purpose Base" they've put it in every type of machine tool.

Here is a base miscible with either oil or water . . . high in fatty oil content . . . possessing a higher film strength than most lubricants . . . antiseptically treated . . . safe for automatics . . . providing cool work, finely finished, with lengthened tool life.

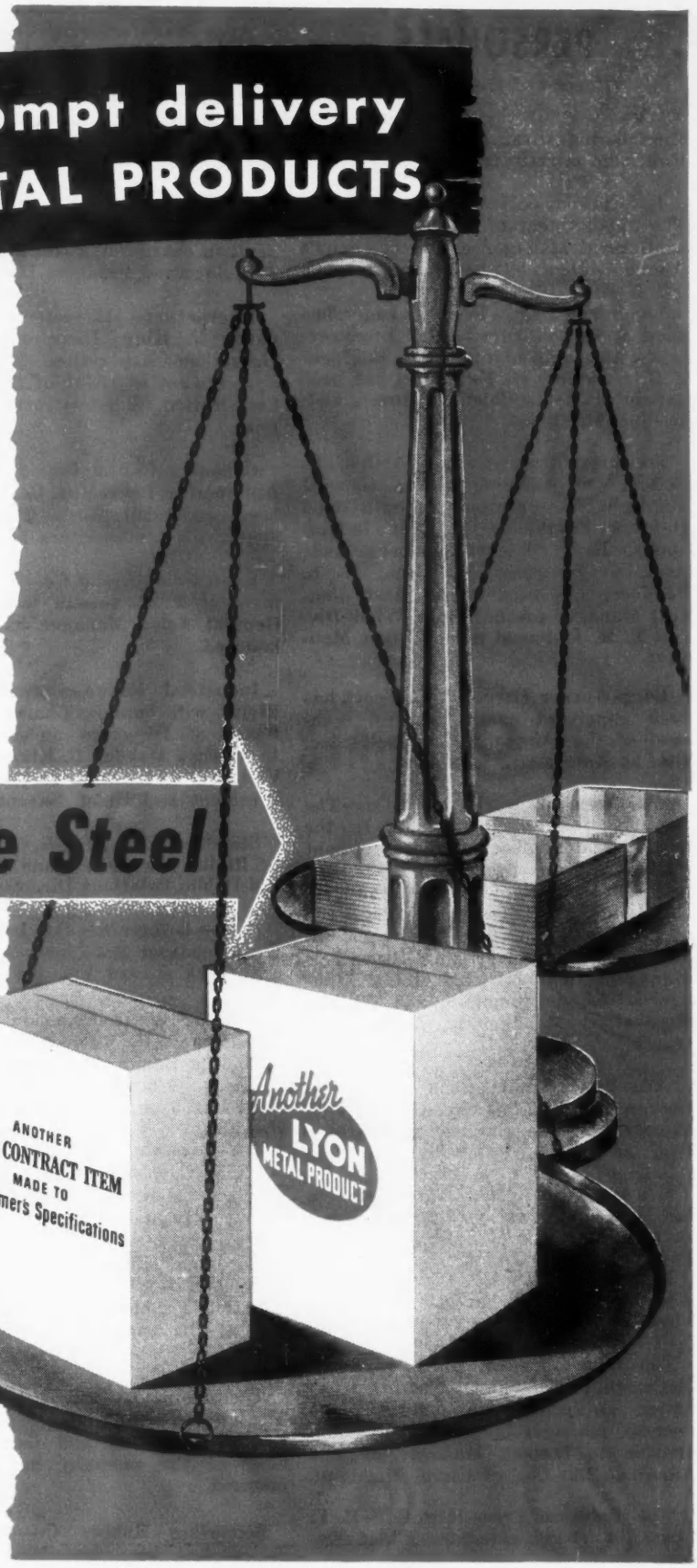
One can hardly ask for more. When you want factual proof and price, please write E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia 33, Pa., or ask the Houghton Man who calls on you.



Houghton's
ANTISEP
All-purpose Base

Soluble in both oil and water. High in fat content and film strength. Excellent for drawing, too!

How to get prompt delivery on LYON METAL PRODUCTS.



Many LYON customers have found it possible to supply us with steel in 12 to 24 gauge sheets. In such cases, we will buy the steel from you and ship the pound-for-pound equivalent in

EITHER

... any selection of LYON standard products (see partial list below) at regular published prices ...

OR

... assemblies, subassemblies, parts, etc., for your products—to your specifications—in an even wider range of gauges—8 to 30.

In other words . . .

YOU Furnish the Steel

LYON WILL MAKE THE PRODUCT

For complete details, write or ask your nearest LYON Dealer or LYON District Office.

LYON METAL PRODUCTS, INCORPORATED

General Offices: 1220 Monroe Ave., Aurora, Illinois
Branches and Dealers in All Principal Cities

A PARTIAL LIST OF LYON PRODUCTS

- Shelving
- Lockers
- Wood Working Benches
- Economy Locker Racks
- Kitchen Cabinets
- Display Equipment
- Hanging Cabinets
- Welding Benches
- Filing Cabinets
- Cabinet Benches
- Folding Chairs
- Drawing Tables
- Storage Cabinets
- Bench Drawers
- Work Benches
- Drawer Units
- Conveyors
- Shop Boxes
- Bar Racks
- Bin Units
- Tool Stands
- Service Carts
- Hopper Bins
- Parts Cases
- Flat Drawer Files
- Tool Trays
- Desks
- Stools
- Tool Boxes
- Sorting Files
- Ironing Tables

PERSONALS

(*Continued from page* 56)

Engineering Divs. He succeeds **K. M. Holt**, who is retiring.

E. I. duPont deNemours & Co., Inc.—The appointment of **Dr. Emil D. Ries** as General Manager of the company's Ammonia Dept. has been announced.

Landis Tool Co.—**H. E. Balsiger** has been appointed Director of Engineering. Succeeding him as Chief Engineer is **R. E Price. W. E. Happel** has been appointed Asst. Chief Engineer, succeeding Mr. Price.

Stewart-Warner Corp. — **Arthur R. Collins** has been appointed General Manager of the company's South Wind Heating Equipment Div. at Indianapolis. **E. G. Fossum** has been made Asst. to President Knowlson. **E. L. Sandberg** has been named Asst. General Manager of the South Wind Div. and **T. M. Redmond** named Plant Manager.

Borg-Warner Corp.—**J. B. Scott** has been appointed quality control manager of the company's Ingersoll Steel Div. at Kalamazoo.

Willard Storage Battery Co.—The election of **Frank R. Somers** to the newly created office of Vice-President in charge of sales, has been announced. romotion of three members of the merchandising and advertising staff was recently announced — **Herbert A. Fotheringham**, Advertising Service Manager; **Donald I. Ehlenfeldt**, Manager of Sales Promotion, and **William H. Walter**, Manager of Market Research.

American Brake Shoe Co. — **N. George Belury** has been appointed President of the Engineered Castings Div.

Bowser, Inc.—**Gerald J. Klopfenstein** has been made Asst. to the Vice-President and Director of Sales.

Fruehauf Trailer Co. (Canada, Ltd.) —**Robert T. Hazell** has been appointed Vice-President.

The Dow Chemical Co.—**Dr. T. H. McConica, III**, has announced his resignation as technical assistant to the general manager of the magnesium division to become Manager of The American Ski Co., of Clare, Michigan.

The Hydraulic Press Mfg. Co.—**E. V. Crane** has been appointed Chief Engineer.

Norton Company — The following resignations have been announced: **Oscar E. Nordstrom**, machine division consultant for the Chicago territory, and **Paul Hoffman**, machine division district manager, New York, effective December 31st.

Avco Manufacturing Corp.—**William A. Blees** has been elected a Vice-President of the company and named General Sales Manager of the Crosley Div. He will make his headquarters at the Crosley Division plant offices in Cincinnati, Ohio.

Witco Chemical Co.—**Benjamin W. Lewis** has been appointed Vice-President, in charge of western sales of the Manufactured Products Div.

International Harvester Export Co.—**Clyde N. King**, Director of Foreign Operations, has retired to accept the appointment of Chief of the Economic Cooperation Administration to Austria.

Canadian Car & Foundry Co., Ltd., Automotive Div.—**Roy H. Sjoberg** has been appointed Asst. General Manager, with headquarters in Montreal.

Radiator Specialty Co.—The appointment of **V. P. Bresan** to the post of General Sales Manager has been announced.

Industrial Rayon Corp.—**Hiram S. Rivitz** will become Chairman of the Board of Directors on January 1st, 1949, when **Hayden B. Kline**, Executive Vice-President, will succeed him as President and Chief Executive officer.

Standard Electric Co., Inc.—**Arthur L. Riklin** has been made Advertising and Public Relations Director.

DeVoe & Raynolds Co., Inc.—**Andrew W. Bornhauser** and **Clarence W. Slocum** have been elected Vice-Presidents.

Jack & Heintz Precision Industries, Inc.—**Frank R. Kohnstamm** has been appointed Senior Vice-President. **Otto T. Hess**, General Counsel and Secretary, has been appointed Asst. to the President.

Philco Corp.—**Dr. Courtnay Pitt** has been elected to the newly-created office of Vice-President, Finance.

Goodyear Tire & Rubber Co.—**A. W. Dunn** has been named Manager of the Aviation Products Div.'s Dayton office and will be company representative at Wright Field.

The Midland Steel Products Co.—The appointment of **Robert C. Artner** as Vice-President and General Manager of the company has been announced.

Seiberling Rubber Co.—**Harry W. Julian** has been promoted to Asst. Sales Manager.

Taylor Fibre Co.—**James B. Holland** has been made Sales Manager.

Motorola, Inc. — **Robert W. Galvin** has been appointed Executive Vice-President of the company.

Heavy Duty Brakes

(*Continued from page* 44)

can be applied to a vehicle at the wheels. For brake systems in use a decade ago, an application time of .5 seconds for buses and .7 for tractor-trailer trains was considered good. Brake release times were from .6 seconds to 1.5 seconds respectively. These times have been reduced to .25 seconds and .4 seconds for application and about .5 seconds for release. Power systems now in the development stage have further reduced these times to approximately .1 second.

New materials have been less in evidence than new designs. For instance, the continued use of asbestos and resin as a lining base has prevented the operation of the brakes at increased temperatures due to the disintegration of the material. Metallic linings have been tried but low frictional characteristics and high cost have limited their use. Asbestos base linings still dominate this field. The temperature limitation of friction materials has therefore not been changed upwards and must be recognized as being equally as restrictive to increased brake capacity as is the dimensional limitation of the size of the brake.

With reference to an efficient shoe arrangement for wide brakes, the problem has been met in several different designs by arranging shoes of conventional width in a side-by-side relationship. These designs have the advantage of distributing the shoe applying force at more than one point across the total brake width and further permit a certain amount of shoe follow-up to meet the condition of drum "bell-mouthing."

Considerable progress has been made in meeting the problem of additional work capacity by cooling the brake itself. Natural circulation of the outside air over the brake drum inner and outer surfaces is secured by using a brake having no dust shield. The fundamental of cooling brakes to obtain increased capacity and life offers the greatest hope for improvement of present designs. Brake drum designs and materials have helped in the exploitation of this principle, and ventilated drums are now used quite widely, especially for buses. Aluminum and copper clad drums are now in the development stage and claim advantages in heat dissipation to the surrounding air.

The most satisfactory approach to the problem however is based on the idea of exposed drum surface; that is, the inside surface not covered by the brake lining or the "hot" surface.

The use of air scoops, or power driven blowers would greatly supplement the present designs of open type brakes and ventilated drums.

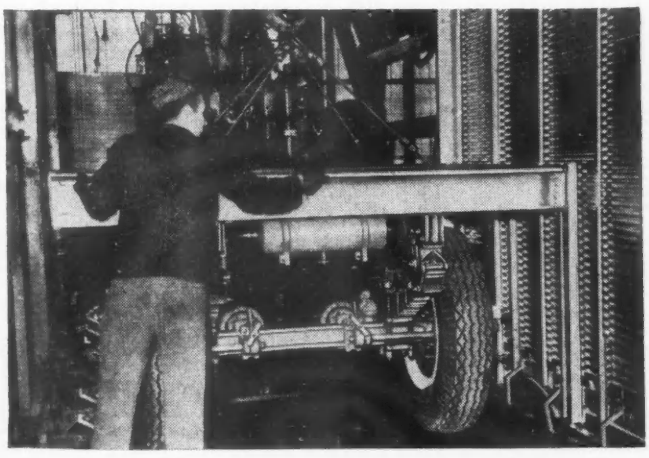
When you want the utmost in weight reduction

...the biggest increase in payload capacity

-build light WITH U·S·S STAINLESS STEEL

THE *much larger* payloads that Stainless Steel trucks and trailers can carry is due to the fact that they drag around *much less* dead weight.

With Stainless Steel construction you can trim off *every* unnecessary pound. And you can do it safely, because Stainless is not only far stronger than other steels, but it has such superlative resistance to corrosion that its amazing strength is permanently protected against deterioration.



That is why Stainless equipment can be built hundreds of pounds lighter to carry hundreds of *extra* pounds of payload and why it costs so much less to operate. That it why its stamina is not affected through year after year of hard service, why maintenance and repair bills are low, why it lasts so much longer. It is this combination of bigger hauling capacity and lower upkeep costs that puts Stainless Steel equipment in a class by itself as a paying investment.

Because U·S·S Stainless Steel has exceptional forming qualities, welds easily and can be used in such very light sections, the cost of construction with this perfected, service-tested Stainless is much less than ordinarily supposed. Our engineers who have worked for many years with the leading builders of stainless equipment will gladly assist you in ensuring the utmost benefits both in fabrication and performance. Have you a copy of our book, *"Fabrication of U·S·S Stainless Steels"?* It is the last word on this subject; you will find it informative and helpful. Write to United States Steel, 2021 Carnegie Building, Pittsburgh 30, Pa.

U·S·S STAINLESS STEEL

USS STAINLESS STEEL UNITED STATES STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

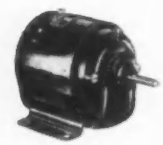
UNITED STATES STEEL AMERICAN STEEL & WIRE COMPANY, Cleveland, Chicago & New York
CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh & Chicago • COLUMBIA STEEL COMPANY, San Francisco
NATIONAL TUBE COMPANY, Pittsburgh • TENNESSEE COAL, IRON & RAILROAD COMPANY, Birmingham
UNITED STATES STEEL SUPPLY COMPANY, Warehouse Distributors—Coast to coast: UNITED STATES STEEL EXPORT COMPANY, New York

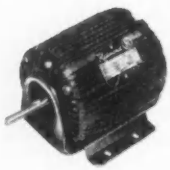
HERE'S
LOW COST
LOW-RANGE
POWER!

Redmond MicroMotors

OVER 100 STANDARD MODELS

A.C. up to 1/15 Horsepower—D.C. up to 1/20 Horsepower





If small motors can make a big difference in the life, performance, or efficiency of your product, best you get acquainted with reliable Redmond Micromotors. They're sturdy little low-range power units... smooth, quiet, dependable in operation... designed, engineered, and built to give you maximum long-life performance at minimum cost. And, with over 100 standard models thoroughly proved in use on countless diversified applications, chances are at Redmond you'll find exactly the Micromotor you want for the job you want it to do. Variations from standard also available to meet special requirements. New Catalog, just off the press, covers both A. C. and D. C. lines plus blowers and speed controllers... want a copy?

Redmond COMPANY, Inc.
OWOSSO, MICHIGAN

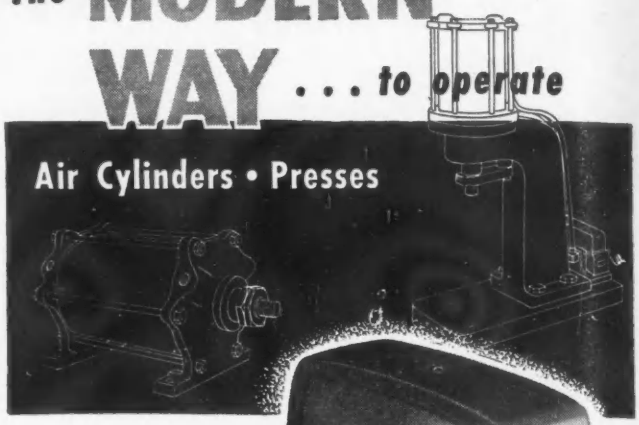
REDMOND ®

OFFICES IN NEW YORK, CHICAGO, DAYTON, LOS ANGELES, SEATTLE

EXPANDED FACILITIES • PROMPT DELIVERIES • SERVICE BEFORE AND BEYOND THE SALE

the MODERN WAY ... to operate

Air Cylinders • Presses



NEW! ELECTRIC

DIRECTAIR

HANNIFIN Air Control Valve!

SEE IT! TRY IT! You'll be amazed at the difference it makes when you use this new Hannifin push button operated air control valve. Without effort, a quick, full power stroke every time! No throttling possible; no short-stroking. Use it to boost production.

10 WATT SOLENOIDS — No pounding... no noise ... no relays needed. Solenoids continuously rated; only momentary contact required. Speeds of 180 cycles per minute, or more!

PILOT TYPE — Remarkably simple! An exclusive Hannifin development. Thoroughly tested. Air pressure does the work with a double-acting piston that operates stainless steel reciprocating disc. No packing or seals to maintain.

NO PACKING TROUBLES — Metal-to-metal lapped valve seat. Long life; little or no maintenance. Remarkably compact. Strikingly styled.

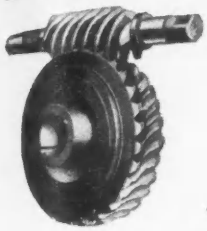
TO MEET YOUR REQUIREMENTS — Type I: Fingertip control of advance and return cylinder strokes through two push buttons. Type II: Single push button control; equivalent to spring return valve action. 3-way or 4-way types. Ideal for remote control ... building into equipment. Sizes 3/8", 1/2", and 3/4". For any pressure from 25 to 150 p.s.i. WRITE FOR DESCRIPTIVE LITERATURE.

HANNIFIN CORPORATION

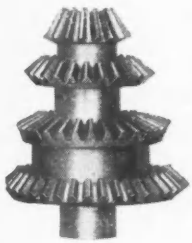
Nationwide Sales and Service

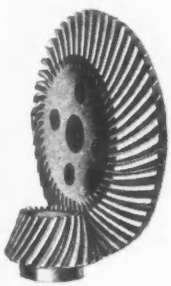
1101 So. Kilbourn Avenue Chicago 24, Illinois

POWER TRANSMISSION EQUIPMENT



Brad Foote Gears





WORMS — Milled up to 12" dia. — up to 1 D.P.

WORM GEARS — Generated up to 108" dia. — up to 1 D.P.

HERRINGBONE GEARS — up to 60" P.D. 18" face, 2 D.P.

STRAIGHT BEVEL GEARS — Straight tooth — up to 60" dia., 10" face up to 4½" C.P.

HELICAL OR SPIRAL GEARS — Generated up to 108" dia., 16" face — up to 1 D.P.

SPIRAL BEVEL GEARS — up to 32" dia., 6" face, up to 1½ D.P.

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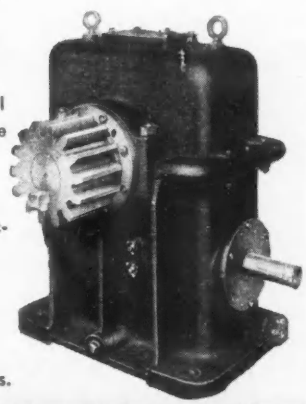

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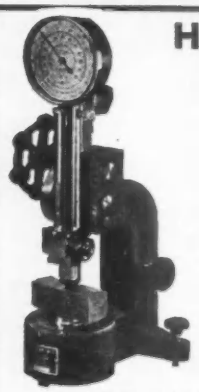

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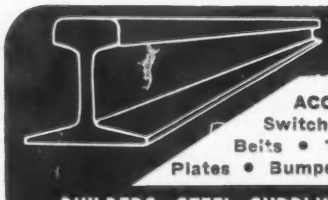

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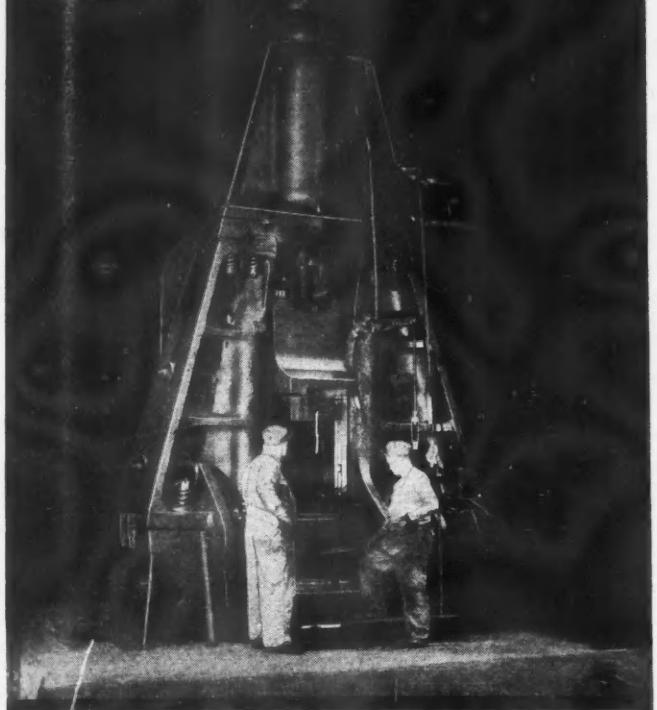

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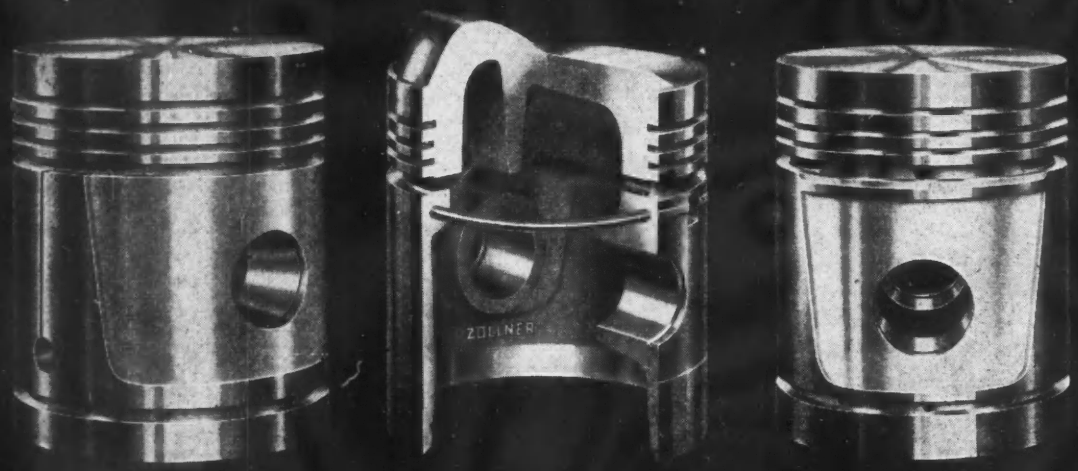

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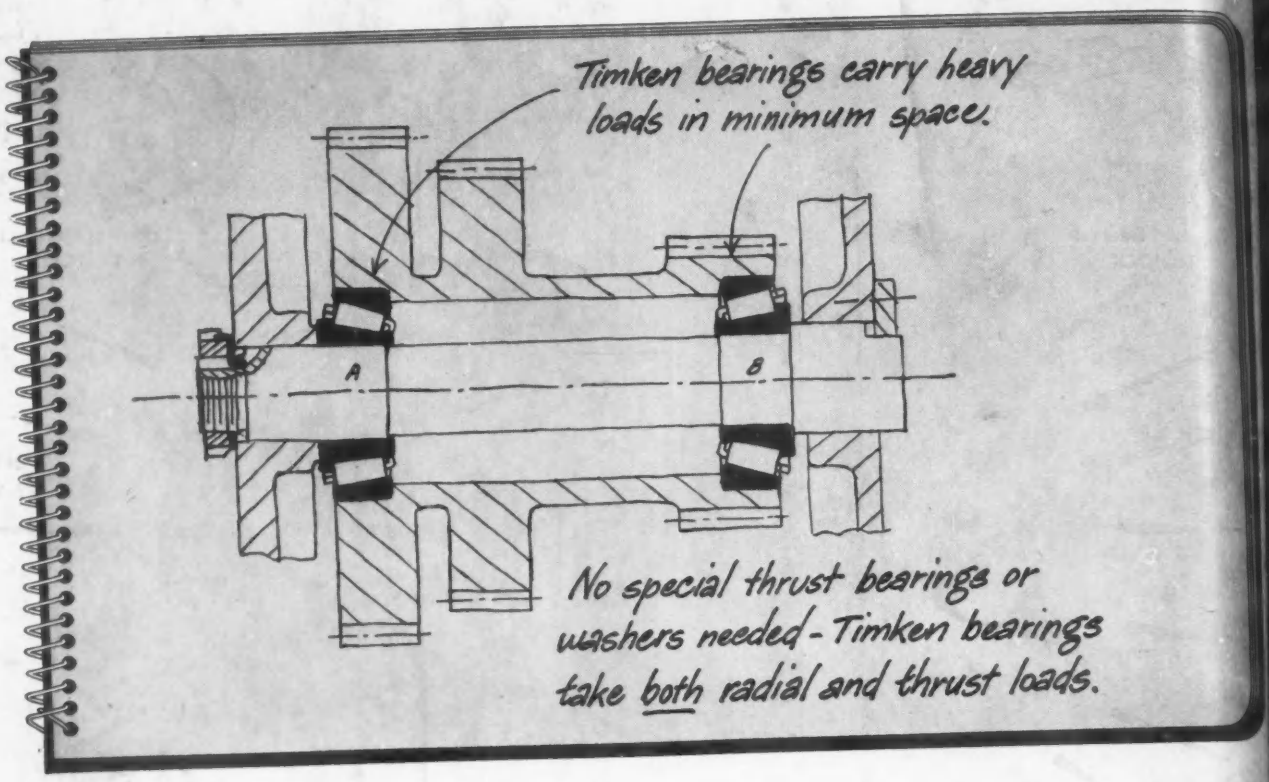
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No special thrust bearings or washers needed - Timken bearings take both radial and thrust loads.

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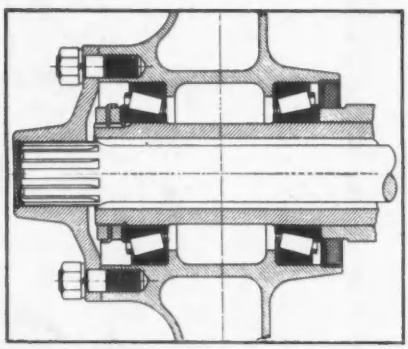

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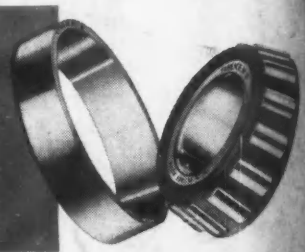

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